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LATERAL ABERRANT THYROIDS

FROM PROF. J. B. MURPHY'S CLINIC

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ABERRANT thyroids situated between the isthmus of the thyroid proper and the base of the tongue, or median aberrant thyroids, have been carefully studied in late years. Two extensive articles were published on this subject in the United States by H. A. Storrs (1) and J. B. Murphy (2). It would therefore seem for a moment that to reconsider the subject in a long article would mean a waste of energy and a repetition of established facts. This is only apparently true, for the lateral aberrant thyroids are of a different embryologic origin, and in their clinical features differ considerably from the median.

The scarcity of records concerning the occurrence of these bodies on the side of the neck does not correspond to reality. I am positive that aberrant thyroids are numerous, especially in countries where goiter is endemic, but as long as they remain histologically and physiologically normal, they do not become conspicuous. Furthermore, when they become pathologic they are extirpated as "tumors," which, in the majority of cases, are not examined histologically, so that their real nature remains unknown. This is especially true if the extirpation is performed in smaller hospitals, where, on account of lack of laboratory equipment and of help, histologic examinations are a secondary matter.

The impossibility of diagnosis, even by able clinicians like Bilroth, Streckeisen, von Eiselsberg, Wölfler, and others, is a strong evidence that the recognition of these bodies is by no means a simple matter. Among the fifteen cases which I was able to collect from the literature of the last fifty years, we can see that a wrong diagnosis was made seven times, and no diagnosis eight times.

Definition. An aberrant thyroid is a mass of tissue having the structure of a normal or pathologic thyroid, and situated at some *definite* distance from the normal thyroid, with which it has no connection whatever.

Nomenclature. The term "accessory" is not a desirable one, because in some of the cases recorded the thyroid proper was absent. From Dr. Murphy's tabulation of thirty-nine cases of superior accessory thyroids, we can see that the thyroid proper was absent in eight cases; no statement as to its presence was made in twenty-six cases. The Germans call it "Nebenkropf," or goiter of a neighboring thyroid. This is equally incorrect, for the accessory thyroid is not necessarily a goiter. A. Wölfler recommends the name "allied"—"Alliirte Nebenschilddrüsen." The best term, in my opinion, is "aberrant thyroids," indicating thyroid segments separated from their mother thyroid, and inserting between these two words a term which would indicate their topography; for example, superior, lateral, posterior, etc.

HISTORICAL

The oldest reference to aberrant thyroids is that of Albert von Haller, who, in 1779, observed the middle lobe separated from the thyroid proper. In 1839, Albers refers to aberrant thyroids. In 1845, Gruber found the middle lobe separated from the thyroid in two out of forty cases examined by him. The first accurate description is found in a monograph published in Milan by Luigi Porta (3). He is the first clinician to observe the tendency of accessory thyroids to become cystic. The first extirpation of an aberrant thyroid was performed by Stanley of England (4), about 1850.

In his work on diphtheria, Krönlein (5) remarks that in the numerous tracheotomies performed by him small nodules were repeatedly found on the cricoid ring of the larnyx. At first they were taken for lymphoid structures; later, however, after careful histological examination, it was found that they had the structure of normal thyroids. The first case recorded in the United States is that of Bernay.

While aberrant thyroids were considered up to the present time more as anatomical curiosities, the clinician of the future, who will refuse to record a definite diagnosis without the indorsement of the microscope, will be surprised to see how often thyroid tissue is found above and to the side of the thyroid proper.

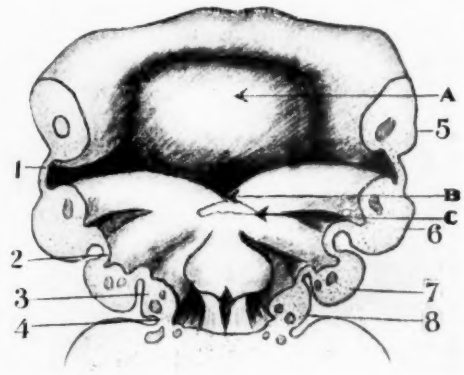

Fig. 1. Vertical section through pharynx of a human embryo of 10 mm. After His. (Reproduced from *Annals of Surgery*, September, 1904.)
(By courtesy of Dr. J. B. Murphy.)
1, 2, 3, 4. Branchial clefts.
5, 6, 7, 8. Branchial arches.
A. Tuberculum impar forming front portion of tongue.
B. Foramen cæcum.
C. Anlage of thyroid gland.

EMBRYOLOGY

The first observers considered the thyroid as developing from only one anlage, the median one. Later, Stieda and Wölfler expressed the opinion that the thyroid gland has a bilateral development. Born corrected this view by adding to the bilateral the median development. His, the greatest embryologist of all times, considers as a very strange embryologic phenomenon that one and the same organ should develop from different tissues. To-day there are two distinct schools: (*a*) School of His; (*b*) School of Born. The former traces the development of the thyroid from the mesobranchial field, that is, the median lobe from the middle portion of the epithelium of the floor of the pharnyx, and the lateral lobes from the sides of this floor, or as His calls it, the "sulcus arcuatus" (see Fig. 1), on account of its horseshoe shape; the latter school considers the middle lobe as developing from the epithelium of the floor of the pharnyx, as conceived by His, and the lateral lobes, as having an independent development from the epithelium of the fourth gill-cleft. Wölfler's conception is that the lateral lobes develop from the epithelium of the first gill-cleft, which corresponds to the second one of Born.

The median lobe is represented by a mass of proliferated cells, which, during the elongation of the neck of the embryo, becomes distant from the pharyngeal opening, with which is connected by a "slender hollow pedicle," the thyroglossal duct (Minot). (See Fig. 2). Embryonic remnants of this duct explain the occurrence of the superior aberrant thyroids, which may be found in the middle line of the neck, along the primitive line of the thyroglossal duct, up to the base of the tongue (foramen cæcum). The lateral lobes develop independently, and are at first entirely separated from the median lobe. In the seventh week of the intrauterine life, the three lobes fuse together. The phenomenon of fusion was discovered by Born in pig embryos, and he found that it takes place when the embryo is 20 to 22 mm. long.

The histologic differentiation of the cells into a glandular, secretory structure begins in the pig before the fusion of the lobes; it is the same in the human embryo. The development of glandular acini commences in the human embyro at eight weeks (His). The time at which the glandular cells begin to secrete is placed by Horsley between six and eight weeks of intrauterine life. The most recent theory is that the entire thyroid of man and mammals originates from the median "anlage" exclusively, and that the post-branchial body degenerates (6).

How Do the Lateral Aberrant Thyroids Originate? In the majority of cases, they are detached segments from the lateral anlages. There is a time in embryonic life when the embryo has practically no neck, and the lateral anlages are situated immediately above the clavicle. During the development of the vessels of the neck, which happens while the neck elongates and the aortic trunk rotates, the pressure of the large vessels of the neck upon the lateral anlages, that of muscles and perhaps that of branchial arches, detaches one or several segments from the lateral lobes, which become, in post-embryonic life, lateral aberrant thyroids. This is the most plausible explanation. Another theory, which has not been advanced by others, or at least of which I am ignorant, is that the lateral aberrant thyroids may occasionally originate either from the normal parathyroids or supranumerary parathyroids. The latter organs may, on account of some disturbance, which as yet is unknown, make an attempt to further development, and finally rank as differentiated thyroids. In order to understand this view, it is necessary to give a brief description of this organ. The parathyroid was discovered in 1880 by Sandstrom. It is a small, pea-sized organ situated on the posterior surface of the lateral lobe of the thyroid. It is constant in man and mammalia. Its histologic picture is that of a dense epithelial organ, for which reason it is called by A. Kohn and many others, "epithelial body." The polygonal epithelium is arranged in larger or smaller clusters, separated by connective tissue rich in large capillaries. If we carefully analyze the histologic picture of an embryonic thyroid and that of an embryonic parathyroid side by side, we see the great resemblance between the two. In fact, the parathyroid is nothing else than an undifferentiated thyroid. The organ may remain in a state of histologic indifference, but, due to some influence, which, as we stated, is as yet unknown, the peripheric epithelium may differentiate itself in the shape of thyroid follicles, and even contain colloid material (Schaper, Schreiber).

As a rule, we find on either side and posteriorly to the lateral lobes, one parathyroid; occasionally we may find one on one side and two on the other; one and three (Schaper). Zuckerkendl found, in one instance, eight. Concerning the embryology of the organ, scientists are divided into two groups. One considers it as an undifferentiated remnant of

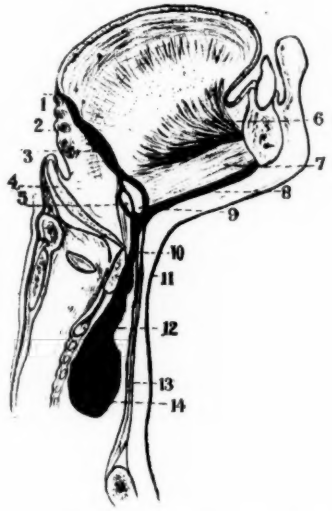

Fig. 2. Diagram of thyroglossal tract and its relations. (Taken from *Diseases of the Tongue*. Butlin and Spencer.) (By courtesy of Dr. J. B. Murphy.)

1. Foramen cæcum.
2. Lingual tonsil.
3. Thyroglossal tract above hyoid bone.
4. Epiglottis.
5. Thyrohyoid bursa.
6. Geniohyoglossus muscle.
7. Geniohyoid muscle.
8. Mylohyoid muscle.
9. Hyoid bone.
10. Thyroglossal tract in front of thyrohyoid ligament.
11. Thyroid cartilage.
12. Cricoid cartilage.
13. Sternohyoid raphe.
14. Isthmus of thyroid gland.

Fig. 3. Chain of aberrant thyroids as seen from the side of the neck.

embryonic thyroid (Schaper, Podack, Baber). The other group, represented by Kohn, Grochuff, Tourneux, Schreiber, trace its development from an independent symmetrical thickening of the epithelium of the fourth gill-cleft, and to the side of the lateral anlages of the thyroid. Kohn, who is the exponent of the latter school, puts the epithelium of the parathyroid gland in the same class with the glandular part of the pituitary body, the cortex of the suprarenal capsule, and the islets of Langerhans in the pancreas.

Comparative Anatomy. All vertebrates possess a median lobe, corresponding to the similar lobe of man. The lateral lobes of man are "presumably homologous with the suprapericardial bodies." Wölfler found in dogs, and Van Bemmelem and Meuron in embryos of lizards, immediately above the arch of the aorta, small glandular masses which they named "aortic glands." The latter are remnants of the middle lobe from the time the trunk of the aorta occupies the middle of the mesobranchial field.

Physiology of Accessory Thyroids. It is more than probable that in some cases the accessory thyroids act as compensatory organs in cases of physiologic inefficiency of the thyroid proper. The following experiment substantiates this observation: Von Eiselsberg extirpated the normal thyroid of a goat and noticed that the animal did not develop myxœdema. On subsequent examination he found that the animal possessed an accessory thyroid. The normal thyroid being extirpated from another goat of the same parentage, and without an accessory thyroid, developed myxœdema. In October, 1905, I assisted Dr. J. B. Murphy in the extirpation of the thyroids and parathyroids of a goat. During the operation we removed every structure suggestive of a gland. The animal is still alive, and did not develop myxœdema. As yet, we have not examined the tissues of the neck to see whether or not they contain thyroid particles. The presence of accessory thyroids, however, was insufficient in some cases to prevent the development of myxœdema.

Myxœdema and cretinism are not, strictly speaking, an evidence of thyroid insufficiency, according to Vincent and Jolly (7). Their able research is based on numerous experiments made upon various animals. In some, while the removal of both thyroids and parathyroids proved often fatal, myxœdema could not be produced. The experimentors conclude that "myxœdema and cretinism must, then, be due to causes more complex than simple thyroid insufficiency."

CLASSIFICATION

The simplest classification is: (*a*) True; (*b*) False. True accessory thyroids are those which have no connection whatever with the normal thyroid. False are those which are connected with the thyroid (even though they are situated at some distance from the gland), either by a strand of glandular tissue or by connective tissue. An intermediary class consists of the aberrant thyroids detached mechanically in post-embryonic life from the thyroid proper. In some cases of fibrous struma, for example, the cicatricial contraction of connective tissue may amputate portions of thyroid, which then become displaced and

independent of the thyroid; cysts on the surface of the thyroid may become detached in the same manner.

From an embryological standpoint, aberrant thyroids may be classified into: (*a*) Median; (*b*) Lateral. The former are remnants of the thyroglossal duct; the latter, remnants of the lateral anlages of the thyroid. Taking the hyoid bone as a dividing line, the median and lateral can be subdived into superior above the hyoid, and inferior below the same. The lateral aberrant thyroids in the vicinity of inferior maxilla correspond to the "submaxillary type" of Virchow. The superior and inferior can be further subdivided into anterior and posterior, according to their situation in front of a tangential line, to the hyoid or behind this line. To this we must add the intratracheal and intralaryngeal, which, in all probability, are dependent from the lateral aberrant thyroids.

TOPOGRAPHY

The boundaries of the aberrant thyroids are upward to a line running from one apex of mastoid processes to the other; downward to a tangential line to the arch of the aorta; laterally, the carotid arteries. (See Fig. 5.) In a few cases, however, the aberrant thyroids extended beyond the carotids and up to the anterior border of the trapezius muscle. In other words, aberrant thyroids are usually found in the anterior triangle of the neck, and only seldom in the lateral. While it is easy to explain the occurrence of median aberrant thyroids in any location between the middle lobe and base of the tongue (the thyroglossal duct running along this line), it is not as easy, however, to explain the high situation of the lateral, unless we admit that the lateral lobes develop from the epithelium of the branchial gill-clefts situated above the fourth, as Wölfler believes to be the case. Even if we admit this, the occurrence of lateral aberrant thyroids on the floor of the mouth (the mylohyoid being considered as the lowest limit of this floor) is rather an embryologic curiosity. The aberrant thyroids found above the clavicle are easily explainable. The lateral anlages begin to develop before the elongation of the neck of the embryo, and at the time this commences, mechanical pressure may detach small segments of tissue which will remain close to the

Fig. 4. Chain of aberrant thyroids as seen after separation of skin and muscles by retractors.

tissues destined to form later the clavicle. The lateral embryonic anlages do not extend beyond the carotid arteries. The occurrence of aberrant

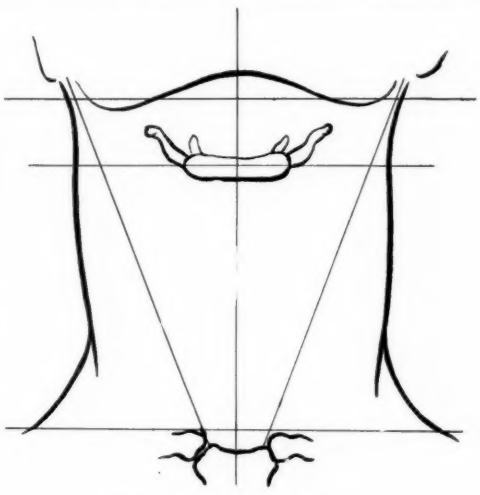

Fig. 5. Topographical diagram.

thyroids outside of these vessels must be considered as a subsequent displacement of detached thyroid segments. Four of our fifteen cases extended beyond the jugular vein; that is, also beyond the carotid arteries. Benign aberrant thyroids have been found in the pleural cavity by Osler. Eberth found small nodules in the lungs of a dog (metastasis traveling along the pulmonary arteries and veins).

Résumé of All Cases Published since 1857, Chronologically Arranged

1. Schlüter, A. C. *De Struma cystica accessoria.* Dissert inaug. Kiliæ, 1857.

Girl, 24. Tumor on side of neck, of three years' standing. Puncture when tumor attained size of hen's egg. Two years later, tumor reached size of fœtal head. Puncture revealed chocolate-colored fluid. *Diagnosis:* Cystic hygroma. Cyst repeatedly punctured, and dark greenish fluid extracted. Finally, extirpation. The wall of the cyst showed, on microscopic examination, *typical thyroid tissue.*

2. Rendu. *Bull. de la Soc. anat. de Paris*, xlvi, 5th series, Paris, 1873, vol. vi, p. 171.

Woman, affected with pulmonary tuberculosis. Cyst on side of neck, 7–8 cm. in length, extending from sternocleidomastoid muscle to left side of trachea. The cavity of cyst contained blood corpuscles, pigmented bodies, and cholesterin plates. "Small glandular masses on the lower part of the cyst showed distinctly the origin of the cyst from thyroid tissue."

3. Demme. *XVI Medicinischer Bericht über die Thätigkeit des Jenner'schen Kinderspitals*, 1878, p. 61.

Cystic tumor size of hen's egg in right submaxillary region. The tumor was aspirated and injected with tincture of iodine on several occasions. Operation revealed a hazelnut tumor adherent to the angle of inferior maxilla. The same proved to be, on histologic examination, a follicular strumous thyroid.

4. Madelung. *Arch. f. klin. Chir.*, 1879, vol. xxiv, p. 82.

Patient, woman, 33. Round, movable tumor on inner side of sternocleidomastoid muscle and on level with cricoid; size of a hen's egg and calcareous in consistency. *Clinical diagnosis:* Calcareous lymph-node. Tumor extirpated. In the lower pole of incision, immediately above the clavicle, two other tumors were found. The large tumor had the structure of a cystic goiter, the supraclavicular masses that of *normal thyroid.* Perfect recovery; no recurrence. *Remarks:* Thyroid proper present and normal. *Rötheln* seem to have been the exciting cause.

5. Stanley. Reference in *Paget's Lectures on Surgical Pathology*, 1853, p. 265, vol. ii; also in *Arch. f. klin. Chir.*, 1879, vol. xxiv, p. 84.

Woman, 62. Tumor of twelve years' standing, situated in lower part and side of neck, over the tap ezius muscle. Macroscopically and miscroscopically it proved to be a typical "goiter." The clinical diagnosis was that of ulcerated sebaceous cyst.

6. Pinner. *Mittheilungen aus der chirurgischen klinik zu Freiburg*, Leipzig, 1882, p. 91.

Tumor situated on side of neck and at level with thyroid cartilage. Structure of thyroid.

7. Streckeisen. *Virchow's Arch. f. pathol. Anat. und Physiologie*, 1886, vol. ciii, p. 139.

Woman, 25. Three masses on left side of neck, independent of thyroid proper. One mass on right side, but latter connected with thyroid proper by a strand of connective tissue. All had the structure of thyroid.

8. Pollard, B. Transact. of the Pathol. Soc., xxxvii, 1886, p. 507.

Man, 35. Tumor of two years' standing, filling entire right anterior triangle of neck; size of orange, cystic, except lower pole, which was occupied by a solid mass of tissue. Operation revealed numerous villous projections from the cyst-wall. The tumor so deeply situated that internal jugular vein and middle third of scalenus anticus muscle had to be removed. Histologically the mass in lower pole was typical thyroid; the villous projections were covered by cubic epithelium.

9. Socin. *Jahresbericht über die Chirurgische abtheilung des Spitales zu Basel während des Jahres* 1886.

Girl, 19. Tumor, size of pigeon's egg, movable, independent of thyroid proper, situated in right submaxillary region immediately above right cornu of hyoid. Extirpation by blunt dissection. Microscopically, thyroid.

10. Hinterstoisser. *Wien. klin. Wochenschr.* 1888, p. 681. (Operator, Von Eiselsberg.)

Woman, 38. Fluctuating tumor, size of goose's egg, in fossa supraclavicularis and extending underneath the trapezius. Another tumor, size of a pigeon's egg, in axilla. *Histopathology of both tumors:* Cystadenoma papilliferum malignum (Zottenkrebs) of aberrant thyroid.

11. Hinterstoisser. *Wien. klin. Wochenschr.*, 1888, p. 681. (Operator, Von Eiselsberg.)

Girl, 12. Tumor, size of child's fist, situated in right submaxillary region. *Clinical diagnosis:* Lymphoma. Extirpation by blunt dissection. Two small nodules found below the tumor. *Histopathology:* Cystadenoma of aberrant thyroids.

12. A. Wölfler. *Arch. f. klin. Chir.*, 1890, vol. x, p. 424.

Woman, 38. Tumor, size of hen's egg, situated on floor of the mouth, on right side. Two and one half years previously, tumor size of a bean. *Clinical diagnosis:* Ranula. Patient had marked derangement of speech. Extirpation with the aid of temporary osteotomy of inferior maxilla. *Histopathology:* Goiter.

13. Haffter. In *Kocher's "Ueber Kropfextirpation und ihre Folgen,"* p. 8, case 233.

Tumor side of neck, behind the sternocleidomastoid muscle. *Clinical diagnosis: Lymphoma.* Derangement of speech. Operation. *Histopathology:* Thyroid (aberrant).

14. Hinterstoisser. *Wien. klin. Wochenschr.*, 1888, p. 652. (Operator, Billroth.)

Man, 44. Tumor of four years' standing, immovable, adherent to clavicle, and extending above and below the same. Tumor also adherent to costo-clavicular articulation. Enlarged lymph-nodes in axilla. Thyroid proper, normal. During operation marked venous hemorrhage. No myxœdema after the operation. No recurrence for a long time. *Histopathology:* Alveolar carcinoma of an aberrant thyroid.

Cases 15 and 16 are ours.

HISTORY OF OUR CASES

CASE 15. Miss M. C., age 24; occupation, housework; admitted to Mercy Hospital January 18, 1906; discharged January 31, 1906.

Family History. Negative.

Personal History. Always lived in Chicago, in healthy surroundings. Is not married.

Previous Illnesses. Generally speaking, was always in fairly good health. Three years ago, however, patient was operated for "tubercular lymph-nodes on right side of the neck."

Menstrual History. Patient first menstruated at 15. Menstruation regular 28-day type, never painful; usual duration four days; no intermenstrual discharge.

Family History. No goiters in the family. No tuberculosis or malignant diseases.

Present Trouble. Ever since five years of age, patient had small, oblong nodules on sides of the neck, which she chose to call "glands." At the same age, patient had a small tumor-mass the size of a hazelnut, just above middle of right clavicle and posterior to sternocleidomastoid muscle. The "glands" on left side of the neck were subject to periodic swellings. Patient could not state definitely whether the fluctuations coincided with the menstrual periods. Three years ago, the swellings on the side of the neck became more conspicuous than usual, for which reason she applied to Dr. J. B. Murphy, who extirpated several swellings, apparently lymph-nodes. (As extirpation of tubercular lymph-nodes on side of the neck is a common occurrence in a large clinic like that of Dr. Murphy, they were not examined histologically by the pathologist. I do not know whether the swellings were really tubercular lymph-nodes or whether they were also accessory thyroids.) The swelling on right side, above mentioned, gradually increased in size, and last year it grew rapidly. Few additional smaller swellings appeared above the clavicular swellings, forming a longitudinal chain on right side of the neck. The swellings were not painful, and did not give rise to pressure symptoms. They were subject to fluctuations of size. The main reasons for applying to a surgeon were, in the first place, cosmetic, and secondly, the fear that the "glands" may be tubercular, as those previously operated. From the clinical course, from the fact that patient was previously operated for tubercular lymph-nodes on left side of neck, a similar diagnosis was made this time. Considering, as I said above, that tubercular lymph-nodes are of common occurrence in a large clinic, physical examination of the patient was not recorded on the history by the interne.

Operation. Longitudinal incision posterior to the sternocleidomastoid muscle revealed five oblong masses resembling thyroid tissue, situated posterior to the named muscle. The tumors were incapsulated, connected by a strand of tissue, and were easily removed. The spinal accessory was located and its injury avoided. There was primary union of wound on seventh day. Patient showed no symptoms of thyroid intoxication or of thyroid deficiency. Thyroid proper was present in its normal location.

Pathological Description

Macroscopically. Specimens consist of a chain of six elliptical masses, perfectly incapsulated in a very vascular capsule. (See Fig. 6.) The six masses are connected by small bands of (probably) connective tissue. The gross aspect, especially mass No. 3, is perfectly that of a thyroid gland. The stroma looks like

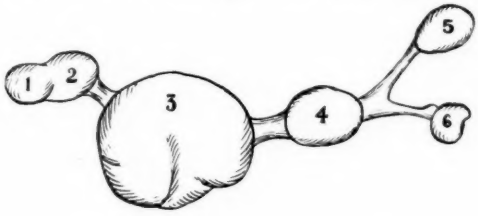

Fig. 6. Chain of six aberrant thyroids

Fig. 7. Aspect of mass No. 3 after longitudinal section and exposure of its stroma.

thyroid. No. 4 resembles a lymph-node. So does No. 5. The pulp in Nos. 1, 2, and 3 is subdivided by centrifugal septæ in segments — typical for thyroid. It is greenish in color. Few cystic cavities scattered in the pulp.

Microscopically. Examination of all of the six tumors exhibits the picture of colloid goiters.

Diagnosis: Stroma colloides of aberrant thyroids.

CASE 16. Mrs. M. B., aged 64, married. Admitted to Mercy Hospital July 15, 1906.

History of Present Illness. Twelve years ago, patient coughed very severely for about six or eight months; this coincided with the beginning of menopause. Following the cough, patient noticed a little lump on the right side of the larynx, corresponding to the right lobe of thyroid. It was painless and perfectly movable. It remained small and painless all the time until a year ago, when the lump began to enlarge and to grow rap-

idly. The lump has lost its original mobility and has become very fixed. Five weeks ago, without injuring the swelling, patient had a hemorrhage from it, during the night. This was so profuse that all the linen was soaked with blood. Ever since, there was some discharge of blood and also of a serous fluid, almost daily. Last winter, patient had some pain in the right side of the neck. The pitch of the voice was considerably lower. Patient had difficulty in swallowing, principally liquids.

One and a half years ago, another lump appeared on the right side of the neck, posteriorly to the sternocleidomastoid muscle, and situated very superficially under the skin. The lump was perfectly movable, and grew gradually and slowly.

Patient's general health has been fairly good during the last year; lost considerable weight, however. Her appetite was good; no gastric symptoms; inclined somewhat to constipation. No genito-urinary symptoms; did not complain of nervousness; slept well.

Previous Illness. Had some of the diseases of childhood; malaria when 16; in bed for two months, having daily paroxysms of fever; had several attacks of la grippe during the winter; two years ago, had poliarticular pains for three months.

Menstrual History. Menstruation began at 13 and ceased at 51. It was always normal in character and duration; there was no relation whatsoever between the menstrual periods and the lumps on the neck.

Obstetrical History. Had two physiologic labors; two children living and well. Had three involuntary abortions, not followed by post-partum sepsis or metrorrhagia.

Fig. 8. Colloid goiter (By courtesy of Dr. J. B Murphy.)

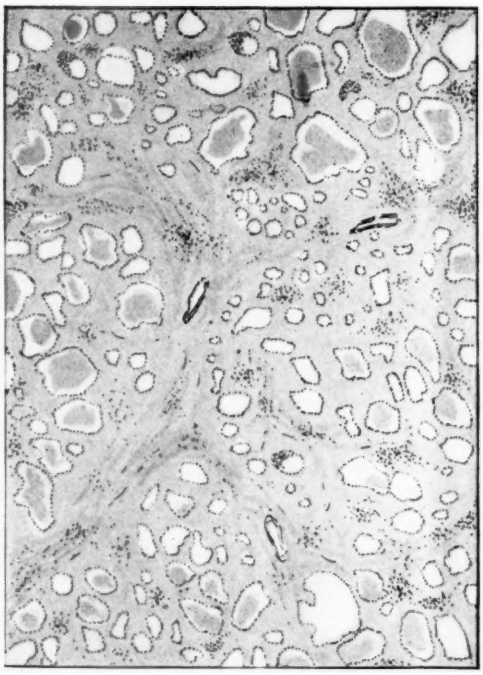

Fig. 9. Structure of normal thyroid (By courtesy of Dr. J. B. Murphy.)

Family History. Two half-brothers died from pulmonary tuberculosis. No malignant growths in the family.

Examination of Patient. Patient is of medium stature; general nourishment only fair; integuments pale; thoracic and abdominal organs negative.

Examination of the Neck. Posterior to the lower third of the sternocleidomastoid muscle there is an oblong swelling the size of a plum; its consistency resembles that of a glandular organ. The mass is perfectly movable under the skin, and is tender on pressure The skin covering it is perfectly normal.

Another tumor, independent of the first, having the size of a mandarin orange, is noticed internally to the first. It extends from the posterior margin of the sternocleidomastoid muscle to the middle line of the larynx, and from the clavicle to the upper level of the thyroid cartilage. The tumor-mass moves slightly with the larnyx when swallowing. Pressure causes local pain. The consistency of the mass is that of an indurated thyroid. Its anterior aspect is ulcerated, and from that surface there is constant oozing of blood. Patient seeks relief principally because of the constant oozing, which has produced a considerable anæmia.

July 16, 1906, patient was operated by Dr. J. B. Murphy. The right lobe of the thyroid was carcinomatous in aspect and was adherent to the side of larynx. This adhesion involved the recurrent laryngeal nerve. The tumor was separated without much difficulty, and the laryngeal surface cauterized with both hot air cautery and zinc chloride solution. In the lower angle of the wound there was an infected lymph-node. The tumor once extirpated, a drainage-tube was inserted for forty-eight hours. This movable tumor first described above was not removed by the surgeon.

While patient was doing apparently well for the first three days, on the fourth day temperature commenced to rise, patient grew weak, and pulse became very rapid. There was no explanation for the increase in temperature, as the wound was practically aseptic. On the fifth day temperature reached 105° and patient died.

Post-mortem examination revealed wound in perfectly good condition, the movable tumor previously described, and situated posteriorly to the sternocleidomastoid muscle, was removed for miscroscopic examination.

Pathological Anatomy

Macroscopically. Tumor-mass (extirpated during life) had the size of a small mandarin orange, was incapsulated on fifty per cent of its surface, the rest being irregular in surface and in places ulcerated; a small ulcerated area, size of a dime, on middle of one of its walls, cauliflower in aspect. On section, the pulp resembled thyroid tissue.

Microscopical Diagnosis: Cystadenoma pseudopapilliferum malignum.

The case was one of primary carcinoma of lateral lobe of thyroid. The tumor on the side of the neck was an aberrant thyroid, which had exactly the same pathologic structure as that of the thyroid proper. My interpretation of the case is, that many individuals have disseminated thyroid particles on the side of the neck (embryologic remnants), and that in cases of emergency, so to speak — thyroid deficiency, malignant growths, tuberculosis, for example — these particles make a compensatory effort. This was probably the case with our patient. The aberrant thyroid of the patient made an effort to compensate the defective thyroid proper, but it finally fell a victim of the inevitable metastisis. (Our case resembles case 10 of Hinterstoissier.)

ÆTIOLOGY

Heredity seems to play some role. In most of the histories I have read, patients made the statement: "My mother and my sister had a full neck"; or, "We all had big necks"; or, "It runs in the family." Aberrant thyroids are frequent occurrences in the Tyrol and Switzerland, where goiter is endemic. Women are most frequently affected with this condition. Among 54 cases of median and later thyroids collected by Dr. J. B. Murphy and myself, 48, or 88 per cent, were women. I venture to say that aberrant thyroids are of an equal occurrence both in men and women, but on account of some disturbance of menstruation, the aberrant thyroids of women become large and conspicuous. There seems to be a direct relationship between the increase in size of these organs and menstrual derangements. In several of the cases reported, aberrant thyroids increased in size regularly with each menstruation.

The ages at which they are most prone to development are between 12 and 35 (Onodi, Budapest). Puberty is an exciting factor. Whooping-cough, pharyngitis, la grippe, etc., were given by various writers as exciting causes. These, I believe, were purely coincidences, and should be entirely ignored, as they bear no relation to the increase in the size of the organ.

SYMPTOMS

The symptoms produced by the lateral aberrant thyroids are entirely different from those of median and superior, also called "lingual goiters." The former seldom cause trouble unless they attain considerable size, when they may displace the trachea, may press upon the arteries and veins of the neck, and produce symptoms which can easily be foreseen. If the organs are deeply situated, they may press upon branches of the cervical plexus and produce severe pain. This, however, is rare, because they are generally extirpated when they become conspicuous. Again, when they increase in size, they generally become cystic, so that the pressure is not so great.

DIAGNOSIS

The diagnosis is difficult, not to say impossible. Out of fifteen cases, the diagnosis was wrong seven times, and in eight cases the clinician was unable to make the diagnosis. Among the specific symptoms of aberrant thyroids we may give: 1. Increase of size at puberty; 2. Fluctuation in size during menstruation; 3. Tendency to autodisplacement and cyst formation. I give below a brief clinical sketch: The tumors are usually unilateral. The size, if solid, is seldom greater than a small mandarin orange; their growth is slow and not associated with subjective symptoms; they

may be single or multiple; their consistency is soft, even, if not cystic; surface is smooth; usually found in women, and in those with derangement of menstruation. They are prone to fluctuation in size, especially at the menstrual period; they have a tendency to become cystic.

DIFFERENTIAL DIAGNOSIS

Lateral aberrant thyroids have been mistaken for almost every tumor on the side of the neck. To substantiate this statement I will give below the various diagnoses made: Ranula, cystic hygroma, lymphoma (twice), calcareous lymph-node, ulcerated sebaceous cyst, periosteal sarcoma of clavicle, and tubercular glands of the neck.

Aside from few pathognomonic symptoms, there is no possibility at hand to make a positive differential diagnosis. The tumors on the side of the neck are so numerous and varied, that in order to do justice to the subject one would have to deal with them in a special article. They are carefully studied by König, and by Levi Cooper Lane (San Francisco). Below I wish to give a simple classification of tumors on the side of the neck:

a. Benign.
- Solid or semi-solid.
- Cystic, containing
  - Air.
  - Serum.
  - Blood.
  - Echinococcus.
  - Cysts derived from softening of solid tumors.

b. Malignant.

Aberrant thyroids may be mistaken for any of these solid or cystic, benign or malignant, tumors on the side of the neck. If they are multiple and deeply situated, they may be diagnosed as tubercular lymph-nodes of the neck.

PATHOLOGICAL ANATOMY

Aberrant thyroids do not differ from the typical aspect of normal thyroid. They are incapsulated in a very vascular red-greenish capsule, the surface of which may contain cystic elevations. They are very soft in consistency; if multiple, they may be isolated or in a chain, the bodies being conencted either by a strand of thyroid tissue or by connective tissue (Fig. 3); the latter may contain glandular particles. As Madelung states, it is an error to think that all aberrant thyroids must be cystic or undergo goitrous degeneration. It is true that most of the aberrant thyroids operated on were cystic or had the structure of a colloid goiter, but this can be explained by the fact that only cystic and goitrous aberrant thyroids became noticeable, and that only patients affected with this condition applied to a surgeon. I am convinced that many aberrant thyroids have a perfectly normal structure, and even those which finally present a pathologic picture were in all probability normal in structure for a considerable period of time. An interesting pathologic feature is that the aberrant thyroids may become cystic, independent of the normal thyroid, and *vice versa*. Some of them have a tendency to undergo carcinomatous degeneration. Hinterstoisser, who made a thorough study of the carcinoma of aberrant thyroids, makes the interesting observation that carcinoma of this organ is less virulent, less malignant than those of thyroid proper. The same authority says: "Deeply situated tumors of the neck, which have no connection with the normal glandular or epidermoidal organs of the neck and head, which histologically resemble a thyroid with a typical epithelial proliferation, which, furthermore, clinically show a tendency to rapid growth, to invade the vicinity, and have a tendency to recur, must be considered malignant; that is, carcinomata of aberrant thyroids." Among the fifteen cases collected, two were carcinomatous. If the aberrant thyroids become malignant, they give bone metastasis in preference. The predilection of malignant thyroids for bone metastasis is a well-known fact. Strange to say, benign adenomata of thyroids may also give metastasis. Bland-Sutton speaks of benign metastasis of thyroid tissue in the frontal and other bones. Adenoma gelatinosum, which is considered a type of benign tumor, may give metastasis. A very peculiar metastasis was found in a case of Dr. J. B. Murphy. Patient was operated for stricture of the ureter. The occlusion was due to a periureteral mass, which, upon histologic examination, resembled thyroid.

PROGNOSIS

The prognosis of operated cases is generally good, *provided the thyroid proper is present.* Five out of thirty-nine cases collected by Dr. Murphy developed myxœdema after the operation, probably because the normal thyroid was absent, a fact which was not discovered before the operation. In some cases, the benign aberrant thyroids which were extirpated have recurred. This, I believe, is not an evidence of malignancy, and the recurrence may be explained by the post-operative increase in size of thyroid particles left behind at the time of operation.

TREATMENT

An aberrant thyroid which has attained some size, which produces subjective symptoms, shows a tendency to cyst formation, and is *associated with a normal thyroid in the normal location*, should be operated.

In every instance it is essential, before operating, to investigate the presence of the normal thyroid; if the latter be absent, operation should be abandoned. It would perhaps be desirable that, in all tumors on the side of the neck in which the diagnosis is not positive, the presence of the thyroid proper should be ascertained. If the diagnosis of an aberrant thyroid has been made, it would be wise to administer for a time thyroid tablets, instead of resorting to immediate extirpation. If the tumor or tumors reduce in size, then the operation should be postponed. If, however, operation be decided upon, it should be borne in mind that the organs are very vascular, and that bleeding will usually accompany the operation. Several operations were marked by this event. Others, however, were performed without difficulty, and the extirpation made by simple blunt dissection. In the presence of cysts, aspiration of its contents is both useless and dangerous; useless because it recurs, and dangerous because it may be followed by severe bleeding. If the tumors are solid and occupy the location of lymph-nodes, as in our case, the spinal accessory should be located, and its injury avoided. It should also be borne in mind that these bodies may become adherent to the jugular vein, and while to tear the latter is of no particular danger, care should be taken not to sacrifice it. If we have to deal with a cyst, and especially if the cyst ruptures during the operation, it is necessary to insert a drain in the wound, because thyroid secretion is toxic, both locally and generally.

I wish to express my best thanks to Prof. J. B. Murphy, who allowed me to study the cases of "aberrant thyroids" in his clinics and use them for publication.

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THE PATHOLOGICAL ANATOMY OF EXOPHTHALMIC GOITER[1]

FROM PROFESSOR BEVAN'S SURGICAL CLINIC AND THE HULL LABORATORY OF ANATOMY

BY DEAN D. LEWIS, M. D., CHICAGO

THE recent attempts to produce a serum for the treatment of exophthalmic goiter have directed attention to the pathological changes found in the thyroid gland in this disease. This work was begun with the intention of studying the processes of secretion in the thyroid epithelium in Basedow's disease, and comparing them with those already described, when the gland is excited to increased secretion by injections of pilocarpine. Such a diversity of opinion exists concerning the exact nature, the constancy, and the specificity of the thyroid changes in this disease, that the scope of the work has been extended to include the general pathology of the gland in Basedow's disease.

Pieces of the thyroid glands from seven cases have been examined. The tissue was fixed in Zenker's fluid, ten-per-cent formalin, and fifty-per-cent alcohol, and later imbedded in paraffine, following the ordinary technique. Sections 3, 4, and 5 μ in thickness were made. These were stained with hæmotoxyline and eosine, Van Gieson's picro-fuchsin; muchæmatin, mucicarmin, and neutral-gentian, as modified by Bensley. The latter stain is the most satisfactory for the study of secretory processes in epithelium, and is employed to the best advantage after fixation in Zenker's fluid.

Earlier pathologists described an increase in the number and a dilatation of the blood-vessels of the thyroid gland, and classified the goiter as vascular. About forty years ago, Virchow described a simple hyperplasia without the formation of colloid nodules or cysts. He noted that the epithelium was undergoing fatty degeneration; the lobular markings were indistinct and the interstitial tissue was increased; the veins dilated and the arteries thickened.

During the past fifteen years several articles dealing with the histological changes in the thyroid gland in this disease have appeared. Greenfield, Askanazy, Haemig, Lubarsch, MacCallum, and Ehrhardt have described an excessive epithelial proliferation, with the formation of branched gland-like tubules, filled with papillary ingrowths, and the decrease or absence of the normal colloid.

Greenfield and Lubarsch compare the histological picture to that of proliferating cystadenoma of the ovary.

Ehrhardt states that the thyroid epithelium varies in size and shape, and that in the granular substance filling the lumen of the follicle, numerous desquamated epithelial cells are found. He believes that the changes are characteristic, and that they do not occur in any other variety of goiter. The regularity with which they are found substantiates the theory that Basedow's disease is caused by either a qualitative or a quantitative change in the secretion of the thyroid gland.

Farner describes the changes found in the thyroid glands removed from ten cases of exophthalmic goiter. In four of the cases the epithelial proliferation and absence of colloid above described were found. He describes three other forms of goiter, which were associated with Basedow's symptom-complex: 1. The ordinary diffuse colloid goiter; 2. Mixed type, the diffuse hyperplastic parenchymatous and the diffuse colloid; 3. Nodular type, nodules being partly parenchymatous and partly colloid.

Types 1 and 3 do not differ, apparently, from the simple goiter unassociated with exophthalmic symptoms. In these, however, Farner finds the following evidences of increased secretion: (*a*) Larger amounts of colloid in the intra and interlobular lymph vessels and veins, less in the arteries, and an increase in the amount of free interstitial colloid; (*b*) Increase of Hürthle's colloid cells,

[1] I am indebted to Dr. Billings for the histories of three of these cases, which were later transferred to Dr. Bevan's service for operation. I am also indebted to Drs. J. B. Murphy, A. E. Halstead, and Peter Bassoe for parts of the thyroid glands from cases of exophthalmic goiter; to Prof. R. R. Bensley of the University of Chicago for suggestions; and to Mr. L. H. Wilder for the accompanying drawings.

decrease of the chief cells, increase of the Schmelzepithelien, flattening of the epithelium, and alveoli filled with a heavily staining colloid, which shrinks little during fixation.

Haemig describes three forms of goiter, which he finds associated with exophthalmic symptoms: 1. A hyperplasia with peculiar cellular changes, which, as in the simple goiter, may be localized and result in nodule formation. In this form the colloid disappears and is replaced by a thin, abnormal secretion. The cylindrical cells are vacuolated, and resemble the secreting thyroid cell as described by Anderson. 2. A number of goiters, associated with exophthalmic symptoms, are histologically of the diffuse colloid type, with or without the formation of colloid or parenchymatous nodules. Haemig was not able to distinguish this type from the simple *goiter*. 3. Intermediate forms, between 1 and 2.

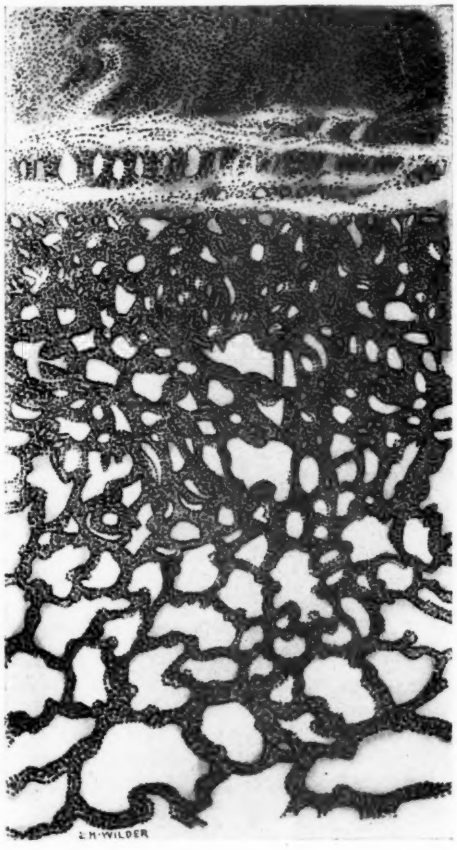

Fig. 1. Low-power drawing of a section from a case of primary exophthalmic goiter. The closely grouped, small cells above are young thyroid epithelium. The intermediate zone is composed of small follicles, which later become transformed into the large, irregular, dilated follicles. These dilated follicles, resembling histologically cystadenoma of the ovary, are most characteristic of these primary cases.

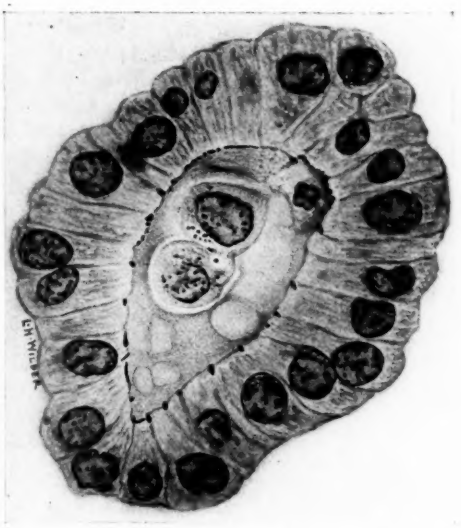

Fig. 2. High-power drawing of a follicle from a case of primary exophthalmic goiter. This follicle is lined by chief cells, which are of the cylindrical type. Cut ends of cement lines are represented by the intercellular dark points. Within the lumen are two large, degenerating epithelial cells. Their cytoplasm contains granules of colloid, and the chromatin threads are scattered throughout the cytoplasm.

Renaut has described a hypertrophic cirrhosis, and lays most emphasis upon the degeneration and disappearance of the intralobular lymphatic vessels. Brissaud, Langhans, Kocher, and Reinbach deny the presence of any characteristic constant histological change in the thyroid gland in this disease, and find that exophthalmic symptoms may occur with any variety of goiter.

Dock has recently made the pertinent observation, that, while surgical operations offer an important opportunity for the study of the pathology of Graves's disease, it should be borne

in mind that the changes may not be the same in the part extirpated and that left in the body. The changes may be localized, and for this reason sections from different parts of the gland should be examined. In one of the cases of this series a nodule about the size of an English walnut was found in the center of the right lobe of the thyroid gland. It differed from the remainder of the gland in color and consistency, being lighter and softer. Upon section it resembled an area of necrosis. Fig. 1 represents a section from this area. A distinction should be made between the primary and secondary cases of this disease. These terms are not employed as originally suggested by Buschan, whose idea concerning the ætiology of the disease has proven to be incorrect in the light of more recent investigations. In the primary cases the goiter and symptoms develop at or about the same time, while in the secondary cases the symptoms develop upon an old, pre-existing parenchymatous or colloid goiter. The importance of this distinction and its pathological and clinical significance will be discussed later. Atypical exopthalmic symptoms have been observed in simple goiters, fœtal adenomata, cysts, and carcinoma (Bloodgood, Ehrhardt).

Fig. 3. High-power drawing of a follicle from a case of primary exophthalmic goiter. The follicle is lined by colloid cells. The colloid granules fill the cells. The nuclear changes and fusion of the chromatin threads are pronounced.

PRIMARY EXOPHTHALMIC GOITER

Changes in Size and Shape of Alveoli. The normal thyroid alveoli are, as a rule, round or oval, and of fairly uniform size, within certain limits. The researches of Streiff, who has reconstructed the thyroid alveoli, seem to show, however, that follicles resembling tubular glands occur more often than is generally thought, and that diverticula of varying size, always communicating freely with the principal cavity, are often present. This tubular variety of follicle differs from the true tubular gland, in that both extremities of the tubule are closed. The tubular form of follicle occurs frequently in the thyroid glands of children, and in the adult thyroid gland adjacent to the capsule.

In a normal thyroid gland, Bayon found some follicles with a diameter of 350 μ. The majority, however, were not larger than 120 μ. Sarbach states that the diameter of the alveoli in adults varies between 20 and 300 μ. The size of the thyroid alveoli varies inversely with age, being larger in the adult than in infants.

The size and shape of the alveoli differ so much in various goiters and different sections of the same goiter, that it is difficult to determine the most constant type. Large, irregular spaces, however, predominate, which are not uniform in size. These dilated spaces are filled with papillary ingrowths; often invaginations from the alveolar wall are seen.

It seems as if the proliferating epithelium, following the lines of least resistance, had grown into the follicle. The connective tissue of the follicle is also invaginated, so that in many sections the invaginated epithelium with its connective-tissue stalk resembles an intestinal villus. In the four primary cases, this histological type *predominates*, and the development of the dilated spaces and their size are, as would be expected, proportional to the severity of the symptoms.

In the severest case, ending fatally, shortly after operation, these dilated spaces were found in all parts of the gland removed, and, where cut parallel to their long axes, resembled a racemose gland. The papillary ingrowths in this case were so numerous and large, that the alveolar spaces were almost completely filled

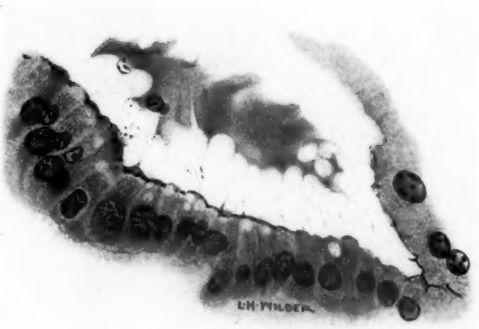

Fig. 4. High-power drawing (primary case), to show vacuoles in cells, containing chromophobe secretion. These vacuoles are regular in outline and are found in the extremity of the cells adjacent to the lumen. In some cells numerous vacuoles are found.

with epithelial cells. This change is regarded to be the most constant and characteristic of exophthalmic goiter by Greenfield, Lubarsch, Askanazy, Ehrhardt, and MacCallum. It resembles closely a proliferating cystadenoma of the *ovary*. Müller believes that the tendency of the alveoli to branch differentiates this type of goiter from the ordinary colloid and parenchymatous forms.

This change in the form of the alveoli with the papillary ingrowths has previously been described by Hürthle and Halsted in the gland undergoing compensatory *hypertrophy*.

In some areas, groups of small, round cells are found lying so closely together that, under the low power, they resemble lymphoid tissue. The intercellular connective tissue in these areas is reduced or absent. Immediately adjacent to these areas, composed of small, round cells, which are embryonal thyroid epithelium, are small follicles. Transitional stages between these small follicles and the larger, dilated spaces are often found. In Fig. 1 three zones are found: 1. The area of small, round cells; 2. The area of small follicles; and 3. The area of large, dilated spaces. Transitional stages from the small, round cells to the large, dilated spaces are frequently found.

Gutknecht has studied the development of the follicles in goiters. According to him, the follicles are formed in the same way, in the cell-columns and cell-groups. The cells separate from each other, leaving a space between them. This space later enlarges, and the cells become rearranged about it to form the follicles. In the cases examined by me the lumen is apparently formed by the cell secretion, which, being discharged, separates the cells. They later become rearranged about the space containing the secretion, and a follicle is formed. In some cases new follicles are formed by evaginations of the walls of pre-existing follicles. These evaginations are later separated from the parent follicle by ingrowths of connective tissue.

THE EPITHELIUM AND ITS SECRETION

Some of the most important changes in the thyroid gland in this disease affect the epithelium. Normally, the thyroid follicle is lined by a single layer of epithelium, the size and form of which depend upon the age of the subject, and the size and location of the follicle. The height of the cell varies inversely with age. As a rule, the cells are flattened in the large, cubical

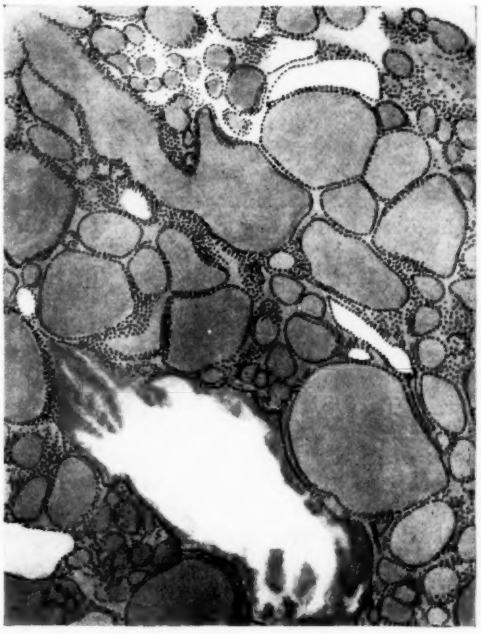

Fig. 5. Low-power drawing (secondary case). Diffuse colloid goiter, which cannot be differentiated from the simple goiter without Basedow's symptom-complex.

in the middle-sized, and cylindrical, with nuclei situated at the base, in the small follicles. Often, however, even in the large follicles, high, cylindrical cells are found, and it is probable that the increase in the size of the follicle is not caused by a flattening, but by a proliferation of the epithelium (Langendorff, Anderson). As the small type of follicle occurs frequently in the center of the gland, the columnar type of epithelium is frequently found in this situation.

Two types of cell are found in the thyroid gland, the principal or chief cell, and the colloid cell. The former predominates. They have well-defined cell boundaries; their cytoplasm is clear and contains but few granules, and their nucleus is vesicular, and clear. The colloid cells occur in less number, and may be distinguished from the principal cells by their granular appearance. They stain deeply with certain dyes, the granular cytoplasm taking the same stain as the intrafollicular colloid. (Simon.)

In the primary cases of exophthalmic goiter several layers of epithelial cells may line the follicle. In the severe case above mentioned, which was characterized by the large branching follicles, three to four layers of cells lined the follicle. The epithelial proliferation was so great that the shape of the cells was altered by pressure.

In the three remaining primary cases the follicles were lined by a single layer of cylindrical epithelial cells. The cells resemble, in some cases, intestinal epithelium. In Fig. 2 the general characteristic of the cells lining the follicle may be seen. This follicle is lined by chief cells, which have a fairly clear cytoplasm and a large vesicular nucleus placed near the base of the cell.

The cell boundaries are distinct, and separating the adjacent cells are cement lines, the cut ends of which are represented in Fig. 2 by the dark intercellular points. This same heavily stained line is continued upon the extremity of the cell adjacent to the lumen. As these cement lines stain with the dyes, which ordinarily stain the colloid, their significance has often been misinterpreted. Hürthle has described them as intercellular colloid, and, according to him, the intrafollicular colloid is discharged through intercellular ducts into perifollicular lymph-spaces. It has been impossible for me to demonstrate any intercellular ducts, and I believe that the intercellular colloid described by him is represented by these cement lines. Anderson and Langendorff have described these lines, and they believe that they occur in thick sections only. I have found them constantly in sections of 3, 4, and 5 μ in thickness.

Transitional stages are found between these chief cells with clear cytoplasm and the colloid cell with its granular cytoplasm. In Fig. 3 a follicle lined almost entirely with a type of colloid cell is seen. These cells are, as a rule, somewhat smaller than the chief cells; the cytoplasm is granular, the granules taking the same stain as the intrafollicular colloid. While the granules are distributed through the cytoplasm, they are most abundant about the nucleus and extremity of the cell bordering upon the lumen. These cells are characterized by peculiar nuclear changes, the chromatin threads having fused, so that with the best nuclear stains it is impossible to distinguish separate threads. These cells correspond to the Schmelzepithelien, and are to be interpreted, I believe, as a variety of colloid cell. Transitional stages between the principal cells and the colloid cells are found in all fields.

It is the prevailing opinion among histologists that the principal cells represent the resting stage or the stage of beginning secretion, and the colloid cell the final stage of secretion. While it is impossible to apply deductions drawn from pathological studies to normal histology, the findings in this case seem to support the theory concerning the relation of principal to colloid cell advanced by the histologists. Another type of colloid cell is frequently found in exophthalmic goiter. These cells have desquamated, and are found in the intrafollicular colloid. They are large, round cells, the cytoplasm of which is undergoing colloid degeneration. In some cases, the cytoplasm is represented by small masses of colloid. The chromatin network of the nucleus is broken up and its threads are scattered throughout the cytoplasm, when the latter is still present. This type of colloid cell is seen in Fig. 2; two of the cells occupy the lumen and are surrounded by intrafollicular colloid. Frequently,

nuclei without any protoplasm are found in the colloid. In Fig. 4 several of these nuclei may be found. Most authorities regard the cells to be of epithelial origin, but Bayon states that only a small proportion represent desquamated epithelium. He regards them as round cells and polynuclear leucocytes. In a case examined by me, leucocytes and desquamated epithelial cells were both found in the follicle.

While the latter types of degenerating epithelium occur frequently in exophthalmic goiter, their presence should not be regarded as characteristic of the disease. They are found frequently in simple goiters. Sarbach describes them in the thyroid gland in cases of infection and intoxication. Probably they merely indicate increased secretory activity of the gland, for Anderson has noted that they increase in the gland following injections of pilocarpine.

The histological study of the processes of secretion in glandular epithelium is always unsatisfactory, as it gives no clue to the chemical changes occurring in the same. This is especially true in pathological studies.

Anderson has described some interesting phenomena in the thyroid epithelium following the injection of pilocarpine. Shortly after the injection, the cells become higher, their central ends enlarge and project dome-like into the lumen of the follicle. Small vacuoles appear in the cytoplasm, which gradually enlarge and wander to the central end of the cell. The vacuoles cause a protrusion of the central end of the cell into the lumen. This protruding portion of the cell gradually separates and becomes free. The nucleus at the same time migrates toward the center of the cell. Anderson, however, has not noted any changes in the appearance of the nucleus. According to him, the vacuoles contain the chromophobe secretions of the gland. At times they are surrounded by a granular membrane, but it is difficult to say whether this membrane is preformed or produced by the fixative.

When this chromophobe material is excreted, small, hyaline, heavily stained granules, which react to stains like the intrafollicular colloid appear in the cells. These granules gradually increase in size until some attain a diameter of from 5 to 6 μ. As a rule, their diameter varies from 2 to 4 μ.

The character of the intrafollicular colloid depends upon the relative proportions of these two kinds of secretions. If the chromophobe secretion is in excess, the follicular content will be finally granular and stain faintly; if the chromophile secretion is in excess, the content will be hyaline and stain deeply.

As far as can be determined by histological study, the secretion of the thyroid epithelium in exophthalmic goiter does not differ from that described by Anderson in the normal gland stimulated to secretion by pilocarpine.

In the chief cells, vacuoles are found, which apparently contain an unstainable secretion. In Fig. 4 several of these vacuoles may be seen. They are round, regular in outline, and are surrounded by a condensed cytoplasm. In some few cases this condensed cytoplasm contains a few stainable granules. In some cells several of the vacuoles seem to have fused, so that the central extremity of the cell is fairly clear. In these cells the cement line is convex toward the lumen, and it seems as if the enlarged extremity of the cell were bulging into the lumen.

Following the discharge of these vacuoles, granules appear in the cell, which take the same stain as the intrafollicular *colloid;* and in the cells in which the granules are found in greatest number, nuclear changes — a fusion of the chromatin threads — are found.

Apparently, if the interpretation of these cellular changes is correct, the type of secretion in exophthalmic goiter does not differ from that of the normal gland. The relation of this secretion to the character of the intrafollicular colloid in this disease will be discussed later.

COLLOID

The character of the colloid varies in different goiters and in different sections of the same goiter. Many follicles contain no colloid. The colloid found in largest amounts is finely granular and does not stain heavily. Thinking it possible that this variety of colloid might be associated with a mucoid degeneration of the cell, I attempted to stain it with mucicarmin and muchæmatin. These attempts were unsuccessful, and the term "thyreomucoin," intro-

duced by Renaut for this variety of colloid, has no significance whatever.

In some cases, dense and heavily staining colloid is found. This colloid is shrunken, but remains attached to the cells at the junction of the cement lines. This dense colloid is found where the colloid cells and large degenerating cells are found in greatest abundance. The shrinkage of the colloid is caused by *fixative*.

I believe that the finely granular colloid, which is the rule in the primary exophthalmic goiter, is indicative of an excessive chromophobe secretion. It may be, however, that the secretion is so quickly absorbed that the colloid is not condensed to form the homogeneous heavily staining colloid found so often in the glands of adults.

Vacuoles of different sizes are frequently found in the granular colloid, the significance of which has been variously interpreted. Anderson regards them as the secretion vacuoles of the cell, which has been discharged intact into the lumen. I believe that the vacuoles result from irregular fixation of the colloid. Sarbach holds the same view, and believes that the number and size of the vacuoles vary with the consistency of the colloid.

Neither the granular colloid nor its absence should be regarded as characteristic of exophthalmic goiter. Sarbach has found an almost complete absence of colloid in the following conditions: Tuberculosis of lungs; diphtheria (1 case); scarlet fever (4); measles (1); alcoholism (2); pneumonia with delirium (1); partial disappearance in delirium, variety not specified (2); peritonitis (1); phthisis (1); rheumatism (1). He believes that the disappearance of the colloid goes hand in hand with increased blood-supply and increased desquamation. It is difficult to say whether the disappearance of the colloid results from a lessened secretion or more active removal of the colloid secreted.

CONNECTIVE TISSUE AND VASCULAR CHANGES

In the early stages of exophthalmic goiter and those in which the symptoms are severe, the increase in connective tissue is not marked. In the older cases, however, and in those in which the symptoms are subsiding, the connective tissue increases in amount. The increase may be secondary to the decrease in epithelial proliferation. It is probable that in some of the cases in which myxœdema has developed upon a Basedow's disease a fibrosis of the gland has occurred. As would be expected, the vascular changes are most pronounced in the cases with the greatest amount of epithelial proliferation and activity. The arteries and veins are dilated; the arterial wall in some cases thickened. I have been unable to find *any* stain which is specific for colloid, and it is impossible to differentiate material found in the veins, and described by some as colloid, from blood serum precipitated by the fixatives.

SECONDARY EXOPHTHALMIC GOITER

Three cases of secondary exophthalmic goiter were examined. In all of these cases a history of a goiter of some years' standing could be elicited. Two of these goiters were of the diffuse, colloid type, and one of the mixed type, partly parenchymatous, partly colloid. So far as I was able to determine, these goiters do not differ, histologically, from the simple colloid or parenchymatous goiter, unassociated with Basedow's symptom-complex.

Farner regards the following changes as indicative of increased secretion in these secondary cases: Increase of colloid cells; decrease of principal cells, with flattening of the epithelium; alveoli completely filled with heavily staining colloid, which shrinks little during fixation; greater amounts of colloid in intra and inter lobular lymphatics and veins, and of free interstitial *colloid*. In the *secondary* cases I have not found any marked increase of the colloid cells or decrease of the chief cells. The heavily staining colloid with little shrinkage was found in one case. (Cf. Fig. 5.) I regard this, however, as accidental, as in the other cases the colloid was shrunken. As mentioned above, we have no specific stains for colloid, and it is impossible to interpret accurately the significance of granular matter found in lymphatics and veins in these cases.

It may easily be seen how differences of opinion could arise regarding the histological changes in the gland in this disease. In those countries in which goiter is endemic the exophthalmic symptoms will frequently be associated

with a goiter which cannot be differentiated from the simple colloid or parenchymatous type, described by Kocher, Langhans, and Reinbach. Where these simple goiters are not so frequent, the primary case, with the changes described by Greenfield, Lubarsch, Askanazy, Ehrhardt, and MacCallum will be found.

The clinical course of the secondary type of goiter differs from that of the *primary*. Kocher, in an article entitled "Some Contributions to the Pathology of the Thyroid Gland," speaks of the clinical difference, as follows: "The secondary variety of the disease, which had to be separated from typical Basedow's disease, was a rather frequent form, and its characteristic feature was, that there existed an ordinary goiter before the development of the Basedowian changes, which were, so to speak, grafted on the common form of colloid goiter. They might give it, therefore, the name of struma Basedowiana (Gravesiana) colloides. In all of these the symptoms were less severe, even when all of them were present. If not, it was especially the exophthalmos which might be absent. Tachycardia was always present. But even here the mitigation was indicated by less dilatation of the heart. There could be no doubt that they had to do with real Basedow's disease in a mitigated form, because the other ocular symptoms were frequently present, and so were most of the typical symptoms. Why all the symptoms existed in lesser degree must be explained by degenerative changes in the gland." At any rate, he had seen cases where the symptoms of true Graves's disease had been greatly ameliorated on the development of an ordinary colloid goiter. That seemed to him an important fact.

These secondary cases with less severe symptoms occur frequently, and in operative statistics a distinction between the two types should be made, as the second undoubtedly offers a better prognosis, both as to immediate and late recovery.

CONCLUSIONS

1. Histologically, primary exophthalmic goiter is characterized by an excessive epithelial proliferation with the formation of large irregular follicles, which are filled with papillary ingrowths. The epithelial cells become cylindrical, and histologically the processes of secretion do not differ from those described by Anderson in the normal gland, stimulated to increased secretion by injections of pilocarpine. The same histological changes have been described in the gland when undergoing compensatory hypertrophy (Halsted, Hürthle). The colloid, when present, is finely granular and stains faintly, although in some sections a dense, heavily staining colloid may be found. The colloid is formed both as a secretion and as a product of degeneration.

2. The goiter in the secondary cases does not differ histologically from the simple colloid or parenchymatous goiter, upon which the symptoms were grafted. The evidences of increased secretion described by Farner in these cases are inconstant.

3. The clinical course of the secondary cases is less severe, and the prognosis is better in these cases, both as regards immediate recovery from operation and later recovery from *disease*.

4. While it is impossible to judge of the secretion of the gland from histological studies, it may be that the primary cases are associated with dysthyroidism, and the secondary with hyperthyroidism.

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RUSH MEDICAL COLLEGE

Department of Gynecology

A RARE CASE OF HERMAPHRODITISM

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THE specimen described in this paper was presented to me by Drs. Ferguson and White of Moncton, New Brunswick. I am also indebted to them for the following clinical notes:

A farmer, aged 33, married four years, the father of twin children, was kicked in the abdomen by a horse on August 18, 1905. Twenty-three hours afterwards he was brought to the Moncton hospital in a critical condition. The abdomen was distended and very painful, and there was constant vomiting.

As he had had for years a large left irreducible inguinal hernia, a diagnosis of strangulation of the latter was made, and operation was carried out. The inguinal canal and scrotum on the left side was found to contain no intestine, but, instead, a mass which resembled an adult uterus, Fallopian tubes, ovaries, and broad ligament. The cervix was adherent to the internal ring and was divided, the entire mass being removed. The abdomen was then opened in the middle line, extensive septic peritonitis being found. Extending from the left inguinal ring a ligament resembling the female broad ligament stretched to the right side of the pelvis. To this was attached a structure exactly resembling an ovary. This was not removed, as the man was much collapsed. Death occurred two hours after the operation, and no autopsy could be obtained.

The specimen as presented to me bore a marked resemblance to the internal genitals of an adult female as removed by supravaginal hysterectomy.

Uterus. The portion of this organ removed from the prostate corresponds to the body of the adult female multiparous uterus. It has a slight depression at the fundus. Its width in its upper part is 5 cm. and in its lower part 2 cm. Its anteroposterior thickness is 2.5 cm. The average thickness of the wall measures 1.25 cm. The cavity has the shape of the adult female uterus. The mucosa is only about 1.5 mm. in average thickness. It is lined with columnar epithelium, which also is found in the glands. The latter are poorly developed, and resemble more those found in the infantile than in the adult uterus. Some are simple; others are divided at their deep ends. They run both obliquely and at right angles to the surface; nowhere is any tortuous arrangement found. The interglandular connective tissue is rich in oval and spindle cells, in parts suggesting interstitial endometritis.

Round Ligaments. On the right side the inner end is found well developed. On the left side it is not distinct, being very much spread out, forming part of the wall of a cyst which lies in the left broad ligament close to the uterus.

Fallopian Tubes. These resemble those of the adult female, the right tube being 9 cm. in length and the left 8 cm. The outer end of each is marked by a number of short fimbriæ, the longest of which is inferior, extending towards the testicle, resembling the ovarian fimbria of the adult female. The orifice of the tube is smaller than that in the female.

On transverse section the lumen is smaller and the muscular portion of the wall larger than in the female; the former is irregularly stellate, like that normally found in the isthmus of the adult female. The mucosa is very simple, the longitudinal folds forming unbranched projections; it is lined with ciliated epithelium.

Testicles. The testicles occupy the position of the ovaries in the adult female, and only differ from them in being smoother. Their length is 4 cm., their width

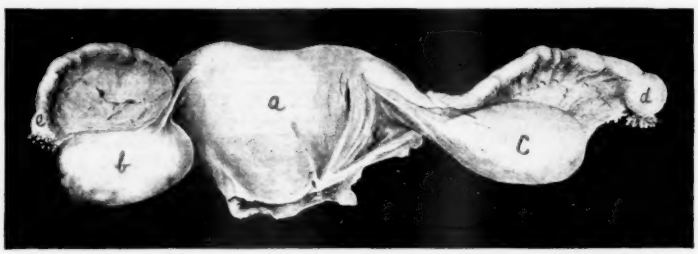

Fig. 1. View of uterus, tubes, and testicles from behind. *a*. Uterus; *b*. Left testicle; *c*. Right testicle; *d*. Right Fallopian tube; *e*. Left Fallopian tube.

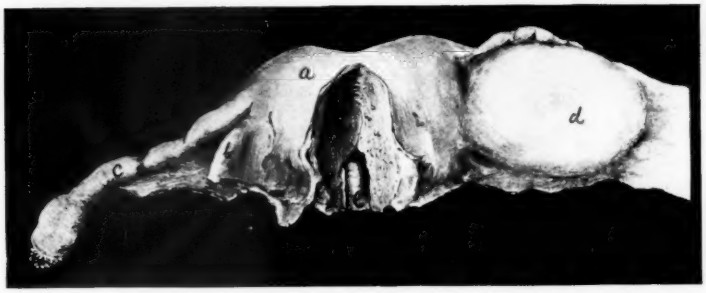

Fig. 2. View of uterus and appendages from the front. An incision has been made in the uterus. *a*. Fundus uteri; *b*. Right round ligament; *c*. Right Fallopian tube; *d*. Cyst in left broad ligament; *e*. Uterine mucosa.

2.5 cm., and their thickness 1.8 cm. Each is connected at its inner pole with the uterus by a distinct ligament 1.2 cm. in length.

The outer covering consists of a thin layer of condensed connective tissue, the cells being mostly elongated spindles arranged parallel with the surface. No germinal epithelium is found on the surface. At intervals, septa extend into the gland. At the hilum a septum of connective tissue is found, corresponding to the corpus Highmori of the normal testicle. It is continuous with the connective tissue of the broad ligament.

The great mass of the organ consists of convoluted seminiferous tubules, lined with several layers of cells.

A few small areas containing pigmented epithelium-like polyhedral cells are found in the connective tissue, resembling the interstitial cells of the testicle (plasma-cells of Waldeyer). Towards the hilum are found ducts lined with a single layer of cubical epithelium. They communicate with the seminiferous tubules and extend into the broad ligament. They correspond to the rete testis of the male. No intermediate tubuli ecti, such as exist in the normal testis, are found. No distinct structure corresponding to an epididymis is visible to the naked eye.

Broad Ligaments. The portions of the broad ligaments which exist resemble those found in the adult female on naked eye examination, except on the left side, where it is occupied by a cyst which bulges the anterior layer forward. The nature of this cyst is not evident. It is very possibly developed in connection with the round ligament, as the latter is wanting as a distinct structure. The wall is composed of fibrous and muscular tissue, the latter being thickest in the upper anterior portion. The inner wall of the cyst is lined with flattened cells in parts, but in a great extent no cells whatever are found. On holding the specimen before a strong light, irregular dark areas are seen in the ligaments between the tube and testicle on each side. These are found, on dissection, to be masses of convoluted tubes, which correspond to the epididymus of the male. They communicate with the rete testis at the hilum of the latter, and also with the vas deferens On section they are lined with ciliated columnar epithelium, at the base of which a layer of small cubical cells is found. On opening the broad ligament close to the

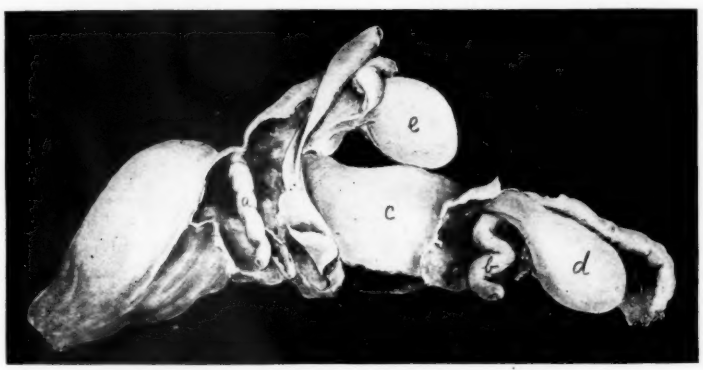

Fig. 3. Dissection of broad ligaments, showing the vasa deferentia. *a*. Left deferens; *b*. Right deferens; *c*. Uterus *d*. Right testicle; *e*. Left testicle.

uterus on each side, a tube about 4 mm. in diameter is found to extend from below upwards toward the inner end of the Fallopian tube, where it becomes much smaller in size and turns outward, running close to the mass of tubes corresponding to the epididymis. This is the vas deferens. In the lower part, its wall is thick and is composed of an inner circular and an outer longitudinal muscular layer. Near the testicle, the latter is almost entirely absent. The mucosa presents several longitudinal projections, three or four of which are well marked and the rest very small. Several of these inclose small spaces, which resemble glands. The lining epithelium consists of a basal layer of small cubical or rounded cells, internal to which are columnar cells.

While this rare and remarkable specimen would have been more interesting if studied with the portions of the pelvic viscera with which they were connected, it is worthy of careful investigation from the standpoint of the Wolffian and Müllerian analogues in the male and female.

In the early human embryo there is a stage in which identical relationships exist in the

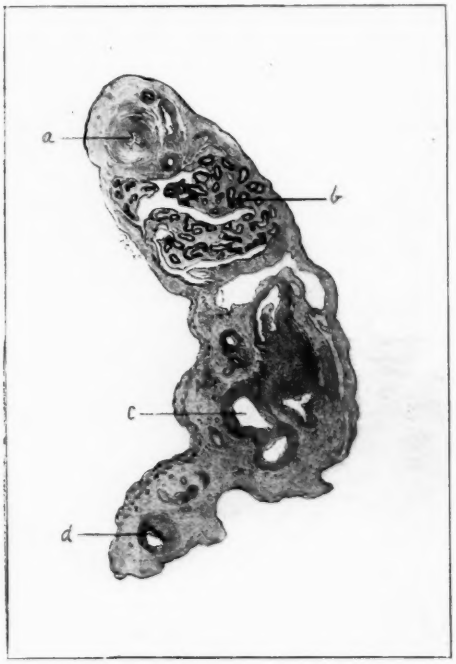

Fig. 4. Section through broad ligament internal to testicle. *a*. Fallopian tube; *b*. Tubules corresponding to epididymis; *c*. Blood-vessel; *d*. Vas deferens.

Fig. 5. Right tube and testicle. *a*. Tube; *b*. Testicle. The relationship of the fimbriated end is shown.

Wolffian and Müllerian tracts, both for males and females. There is no true hermaphroditism or condition of double sex, i. e., there is not both an ovary and testis, but only an indifferent gland, which later becomes either an ovary or a testis.

Müllerian Tract. The Müllerian ducts are usually believed to be formed later than the Wolffian, and to be derived from an invagination of the cœlomic mesothelium on the outer surface of the Wolffian ridge. It is possible that this view may be incorrect, and that it may be formed from the Wolffian duct, especially from that portion related to the early pronephros, as is the case in fishes. The fringed opening of the Fallopian tube communicating with the peritoneal cavity certainly suggests this origin.

In the male, there is a fusion of the lower ends of the Müllerian ducts, giving rise to the sinus pocularis, vesicula prostatica, or uterus masculinus, situated in the prostate. It forms a cul-de-sac which opens in the middle line of the prostatic part of the urethra, and extends upwards and backwards 6 to 12 mm. in length. Sometimes its blind end reaches the posterior surface of the prostate just beneath the third lobe. Rarely, it may form a projection posteriorly, which may be bifid, as in the interesting specimen described by Primrose.

It is lined with columnar epithelium which may be ciliated, and small glands extend out-

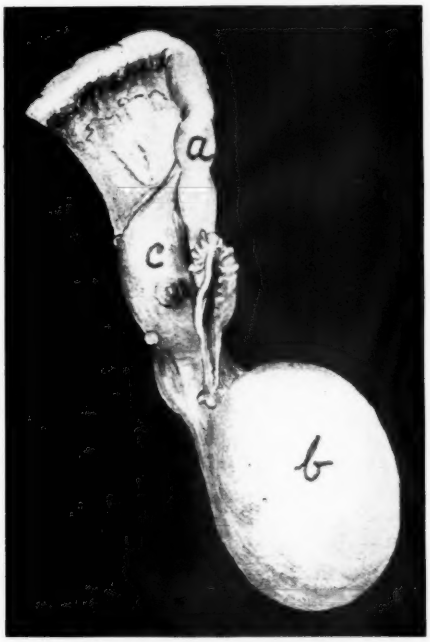

Fig. 6. Left tube and testicle. *a*. Tube; *b*. Testicle; *c*. Small cyst under outer end of tube.

ward from the canal. A more or less distinct fibromuscular wall surrounds it, blending with the neighboring prostatic tissue. To what extent the latter is derived from the Müllerian tract is not definitely known. While its fibromuscular and glandular tissue suggests a resemblance to uterine elements, it is probable that the lateral lobes develop mainly from the upper part of the urogenital sinus, and the third lobe mainly from the posterior portion of the stalk of the bladder. The upper end of the Müllerian duct persists and is carried downwards, with the testicle forming a small sessile hydatid situated at the upper end of the latter. The intermediate portion of the duct becomes stretched and mostly obliterated during the descent of the testicle. A small portion may sometimes be traced in the anterior border of the epididymis through a considerable period of fœtal life.

In the specimen under consideration, the entire Müllerian tracts have been retained. Blending has taken place in the lower ends to form a structure resembling in size and shape the adult female uterus, projecting from the posterior surface of the prostate gland. On section, the wall resembles exactly the structure of the uterus, being composed mainly of non-striped muscular fiber. There is a cavity which has the shape of that found in the uterus, and it is lined with a mucosa which is covered with ciliated columnar epithelium. The glands of the mucosa resemble uterine glands, but are not so numerous, nor do they run such a wavy course nor divide to such an extent at their deep ends. Nothing can be said regarding the lower end of the organ below the line of amputation; it might be regarded as the cervix.

It is very surprising to find in the male a structure of such size and shape corresponding to the adult human uterus. In the female such a development is only found in association with a well-marked ovary. Defect in the latter is associated with the infantile type of uterus, i. e., an undeveloped uterine body, and when the ovarian tissue is scanty or absent, there may only be a rudimentary uterus. There is, therefore, a very strong reason for believing that the small structure which was not removed from the body, which was described by Drs. Ferguson and White as attached to the posterior surface of the broad ligament and resembled an ovary, was in reality of this nature. If this is the case, the patient must have been a true hermaphrodite.

The Fallopian tubes in the specimen differ

Fig. 7. Sectional view of testicle.

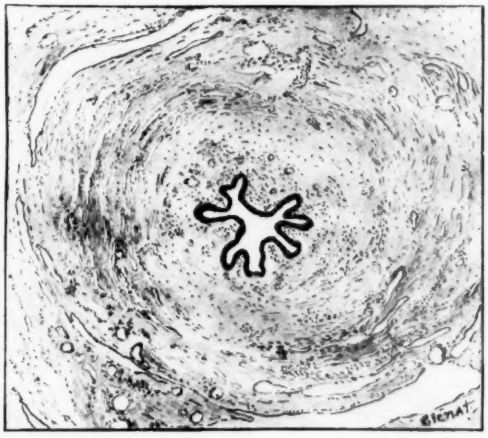

Fig. 8. Transverse section of middle portion of left tube.

in external appearance very slightly from those found in the adult female. The fimbriæ are not so numerous nor so well developed. On microscopic examination, the mucosa is found to be much less complex, the longitudinal folds projecting but slightly into the lumen.

Wolffian Tract. The pronephros, while probably represented in the embryo of all vertebrata, makes only a transient appearance,

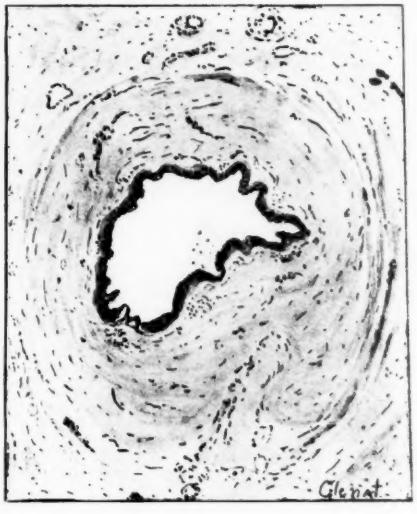

Fig. 9. Section of vas deferens.

though in some of the lowest fishes it is a permanent structure. It consists of a duct and lateral tubules situated at the anterior end of the Wolffian ridge. The pronephric duct probably represents the anterior end of the Wolffian duct. The lateral tubules in lower forms communicate with the cœlum by trumpet-shaped ciliated openings, each one having in its course a glomerulus. I have already referred to the suggestion made by some authorities that the trumpet-shaped outer end of the Fallopian tube may represent the anterior end of the pronephric duct. It is also possible that the fringed openings known as accessory ostia may be derived from remnants of the pronephric tubules. The small round masses of tubules occasionally found in the broad ligament near the outer end of the Fallopian tube may also represent remnants of pronephric glomeruli. In my specimen there is a small cystic swelling close to the outer end of the tube, with a slightly fringed ostium, which probably represents a pronephric tubule. In this situation, in the female, is usually found the stalked hydatid of Morgagni, usually stated to be derived from the upper end of the Wolffian duct or from a tubule developed from it. It may, however, be pronephric in origin.

The mesonephros, or Wolffian body, develops later than the pronephros, and while serving in fishes and amphibians as a functional kidney, in the higher vertebrates it serves this purpose only transiently. It consists of a longitudinal Wolffian duct and lateral tubules. The origin of the duct in the human embryo is not certain. It is generally believed to be derived from a ridge which develops on the outer surface of the intermediate cell-mass, but as in several lower vertebrates it has been shown to arise on the lateral surface of the body by an invagination of the epiblast, gradually moving inwards to the intermediate cell-mass, there is a strong reason to believe that it originates in this manner in the human embryo. The mesonephric tubules develop from the mesoblast of the intermediate cell-mass.

Glomeruli develop on many of these tubules, and probably perform a transient secretory renal function, which gradually ceases as the true kidneys develop. The anterior row of tubules shows the least glomerular formation,

Fig. 10. Tubules in broad ligament corresponding to epididymis.

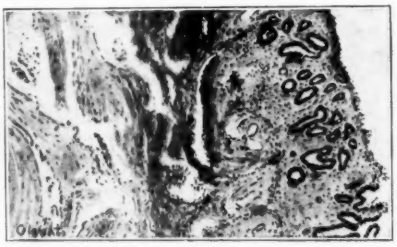

Fig. 11. Section of mucosa and musculature of uterus.

Fig. 12. Outer part of right testicle, showing capsule and tubules.

and are known at the genital tubules, the posterior tubules performing chiefly the secretory function. In the female the Wolffian duct and tubules appear as rudimentary structures in the adult, being limited mainly to the broad ligament. The remnant of the duct appears as a small tube lying beneath the Fallopian tube and running parallel to it. The genital tubules extend from it towards the hilum of the ovary, being, however, functionless, and are known as the epoöphoron, organ of Rosenmüller, or parovarium. The renal Wolffian tubules are found as remnants between the ovary and uterus, and form the paroöphoron. The lower portions of the Wolffian ducts are generally believed to disappear after the uretero-renal buds spring from them. It is, however, widely believed that remnants of the lower parts of the ducts and tubules may occasionally persist in connection with the uterus and vagina, sometimes giving rise to cysts.

When the ducts persist as tubes running down the sides of the uterus and vagina, as is the case in the sow, they are known as the ducts of Gartner. Skene's ducts, believed by many to represent the lower ends of the Wolffian ducts, are merely involutions of the urogenital sinus, and correspond to prostatic glands in the male.

Berry Hart has recently advanced the view

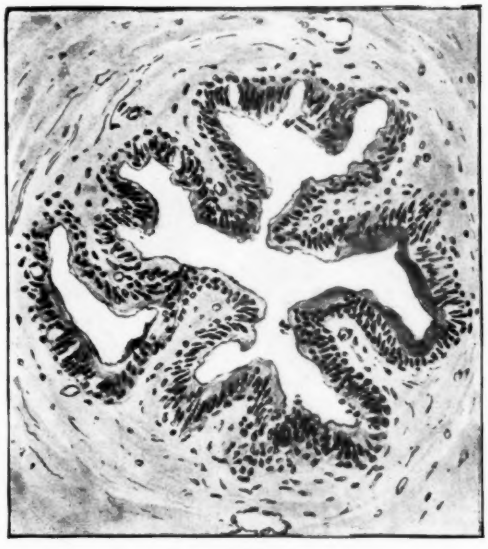

Fig. 13. Section of vas deferens.

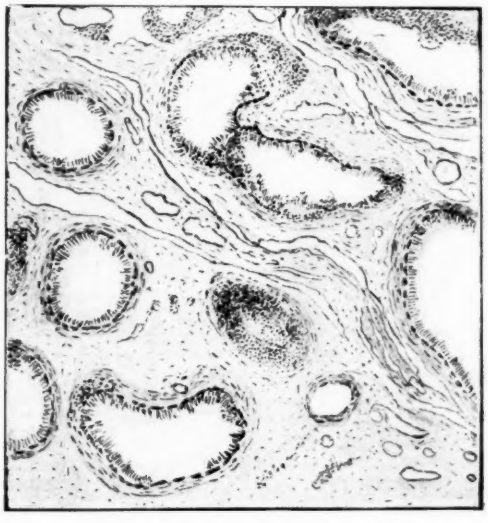

Fig. 14. Tubules of testicle near broad ligament.

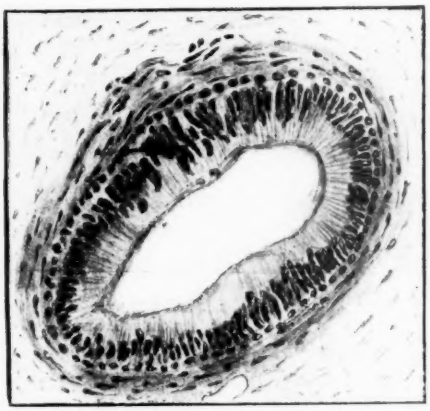

Fig. 15. Section of tubule in broad ligament corresponding to epididymis.

that the lower ends of the ducts normally undergo bulbous proliferation, and help to form the lowest portion of the vagina. In the male, the Wolffian duct develops into the tube of the epididymis, the vas deferens, the common ejaculatory duct, and the seminal vesicles. Its upper end, or the original pronephric termination, gives rise to the small stalked hydatid situated at the upper end of the testicle. The genital Wolffian tubules form the vasa efferentia and coni vasculosi, and connect the epididymis with the rete vasculosum testis, and hence with the straight and seminiferous tubules of the testis.

The renal Wolffian tubules give rise to the vasa aberrantia of the globus minor of the epididymis and to the paradidymis or organ of Giraldes occasionally found in the front of the cord above the globus major.

In this specimen the arrangement of the Wolffian tract differs considerably from that found normally either in the adult male or female. The vas deferens can be traced alongside the uterus near to the origin of the Fallopian tube where it turns outward, diminishing in size and becoming merged with the mass of tubules situated in the broad ligament between the ovary and Fallopian tube. Near the outer end of the latter is a small collection of tubules and a cyst, which may be pronephric in origin.

It is interesting to note that the vas deferens cannot be traced in the broad ligament as a longitudinal tube, corresponding to that which is found in connection with the organ of Rosenmüller in the female. Each is derived from the Wolffian duct, but in the specimen under consideration the position of the longitudinal tube is occupied by the tortuous duct of the epididymis.

A SPECIMEN OF FŒTUS AMORPHOUS ANIDEUS

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THE specimen about to be described was presented to me by Dr. G. J. Hagens of Chicago, to whom I am indebted for the following clinical notes.

Clinical History. The patient, an American woman, is 29 years of age. Her height is 5 feet 5 inches, and her weight 120 pounds. Her pelvis is slightly justominor in type. Apart from the usual diseases of childhood, she had enjoyed good health. Menstruation began at 15, and is of the 28-day type. She was married in April, 1904. Her last menstruation occurred during the first week in September, 1904.

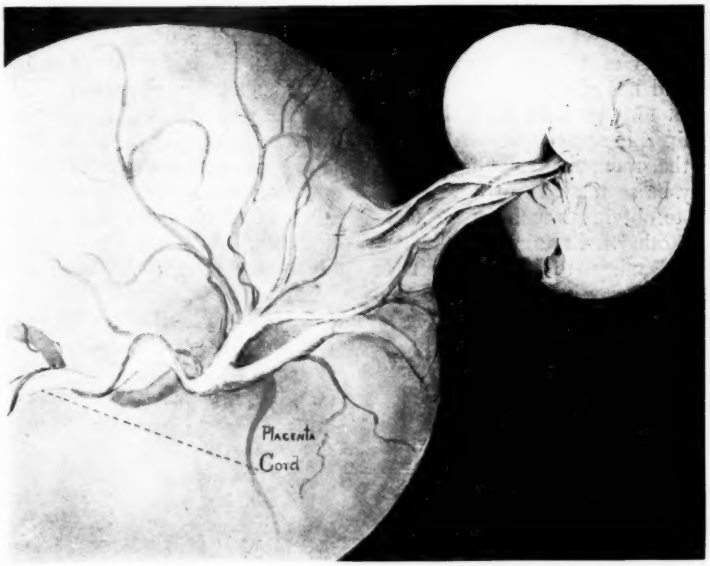
The period of pregnancy was marked by no unusual features. During the few days previous to labor, pain was felt in the left flank.

Labor began in the evening of June 17, 1905, and terminated the next morning. The head of the fœtus presented and lay in the left-occipito anterior position. After the delivery of the fœtus, which weighed 7½ pounds, there was an interval of a few minutes, after which the amorphous fœtus was expelled. After fifteen minutes the placenta and membranes escaped. The puerperium was normal. Lactation was deficient.

Naked-eye Description of the Specimen. The amorphous fœtus is a somewhat oval mass, measuring 4⅛ inches in length and about 2½ inches in thickness. The outer surface is fairly smooth, resembling skin,

one quarter of which is covered with black hair, like that of the fœtal scalp, this part being darker than the rest of the fœtus. At one pole there is a depression, which leads some distance into the mass, at the edge of which is a small cartilaginous projection, half an inch in diameter. Nearly an inch from this is a sulcus an eighth of an inch in depth, attached to the middle of which are the membranes. Extending in these from the fœtus to the placenta are the vessels which correspond to the umbilical, consisting only of an artery and a vein. No cord is present.

Sections of the fœtus show that it consists chiefly of œdematous connective tissue, containing fat irregularly distributed. At one portion there is an irregular mass of bone, suggestive of a compressed cranial base.



Fœtus amorphous anideus. Its attachment by a fold of membranes to the well-formed placenta is shown.

The specimen indicated that the pregnancy belonged to the class termed allantoido-angiopagous. In such a condition the twins are uniovular and monochorionic, the placenta being single. The amnion may be single or double. One fœtus is usually normal in structure, while the other is more or less malformed. The latter may be regarded as parasitic on the former, being supplied with blood either through a separate umbilical cord, whose vessels anastomose with those in the cord of the well-formed fœtus, of by vessels which extend in the chorion from the placenta. In this specimen the latter arrangement is found, no cord being attached to the amorphous fœtus.

Three varieties of allantoido-angiopagous twin may be described; viz., paracephalic, acephalic, and amorphous.

The paracephalic twin is that in which a head is present, though usually more or less malformed, the body and limbs being deformed in various degrees. Among the latter peculiarities may be mentioned malformed or absent upper or lower limbs, rudimentary body, malformed or absent viscera. The heart may be absent, and if present, is usually malformed.

The acephalic twin is distinguished by the absence of a head. There may be a considerable portion of trunk, though in some cases this may be represented only by a pelvic region to which lower limbs are attached. The heart is usually absent, and hence the term "acardiac" has been used to describe this variety, but it must be noted that occasionally cardiac tissue may be present.

The amorphous twin is one which bears little resemblance to a fœtus, being usually

a rounded or ovoid mass. If rudiments of limbs are present, it is described as *fœtus amorphous mylacephalus;* if absent, as *fœtus amorphous anideus*. The latter sub-variety is that to which my specimen belongs. It is the second which it has been my privilege to study. The other specimen was obtained by me in 1895, and was described in Ballantyne's *Teratologia*, vol. ii, p. 3. It was a pear-shaped mass, measuring 16.5 cm. in length and varying from 6 to 11.5 cm. in width. In referring to the great rarity of the condition, Ballantyne stated that my specimen was only the twenty-fourth of all recorded cases.

The teratogenesis of this malformation is unascertained, and has given rise to considerable speculation. Many hold that the condition of twinship is in some unknown manner the cause of the monstrosity. One of the twins may early be so related to the vascularized chorion as to obtain a much better blood-supply than the other. Certain it is that the umbilical cord leading to the amorphous fœtus may be poorly developed or may be entirely absent, blood being carried in vessels which run in the membranes. Possibly, in some cases, as Ballantyne suggests, the difference in development is due to the different circulatory arrangements in the fœtuses; that in the well-formed one being the normal umbilical, derived from the allantoic (hypogastric), and that in the latter being vitelline in origin. The imperfect character of the latter may be the cause of the poor development of the fœtus related to it.

In the specimen under consideration, no trace of bladder or intestine is found, nor is there any umbilical cord. There is every reason to believe that the artery and vein extending in the membranes from the fœtus to the placenta are vitelline in origin.

Some writers think that the defect in the fœtus is independent of the twin condition, and that the latter, by affording a means of sustenance to the monstrosity, acually prevents it from succumbing at an early period of pregnancy.

The œdematous condition of the tissues of the amorphous fœtus indicates that the circulation of blood through it is carried on with difficulty. As it contains no heart, the blood stream must be forced through its vessels by the activity of the cardiac organ of the normal twin. The distribution of the arteries and veins and their relationships in the tissues are entirely unknown, and would afford an interesting field for investigation.

AFFECTIONS OF THE EYE IN RELATION TO PELVIC DISORDERS

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ORDINARILY, normal menstruation is not accompanied by any changes in connection with the eyes, either functional or organic. Yet, occasionally, these may be found. Thus, in some cases, marked congestion of the conjunctiva may take place during each period. This may cause a feeling of burning, photophobia, marked lachrymal secretion. Sometimes the condition may resemble inflammation, a marked purulent secretion being caused. Landsberg has described a herpetic eruption of the conjunctiva. Leber observed a case in which there were recurrent retinal hemorrhages and papillitis, causing disturbance of vision. The patient was otherwise normal. In course of time one eye became completely destroyed. H. Cohn observed a patient in whom marked protrusion of the eyeballs took place at each period, accompanied by swelling of the thyroid and heart-palpitation. Between the periods these phenomena were entirely absent.

In some cases disturbances of vision may be noted. Finkelstein studied twenty healthy young women, and observed a shrinkage of

the field of vision, which began a day or two before the period and became most marked on the third or fourth day. This change referred not only to white light, but also to red, green, yellow, and blue. In twenty per cent of the cases the color sense for green was altered, this color appearing as yellow.

Very many observations are on record to show that not infrequently during menstruation eye affections already in existence may be aggravated.

In various conditions causing amenorrhœa, changes in the eyes have also been observed. Thus, Von Mooren noticed double interstitial keratitis recurring each month in a woman of 28. She had been thus troubled from her fifteenth year. He has also described a similar case in which disseminated choroiditis occurred. Jüngken has reported a case in which conjunctivitis and hemorrhage recurred at intervals of a month. The occurrence of hemorrhage in the conjunctiva or other parts of the eyes has been frequently noted in women with amenorrhœa, and has often been regarded as vicarious menstruation. In some of these cases blood has escaped from other structures; e. g., ears, nose, mouth, nipples, etc. Dysmenorrhœa may also be associated with eye disturbances of various kinds.

A good many interesting cases have been recorded of ocular changes occurring in connection with the establishment of the menstrual function. Brierre de Boismont observed a young girl in whom blindness was present more or less for six weeks. There was an intraocular hemorrhage, which cleared up after the occurrence of menstruation.

Von Mooren described the case of a young girl who had menstrual molimina every month without any bleeding, and at these periods there was marked inflammation affecting the cornea. This condition lasted a year until the menstrual flow was established.

I have recently had under my care two cases, whose clinical histories seem to me worthy of record.

CASE 1. Mrs. S., aged 37, married 15 years. Admitted to my service in the Presbyterian Hospital, April 4, 1905.

Complaint. Sore eyes, pain and distress in the pelvis, leucorrhœa. The eyes have troubled her for eight years. At first they became very red and sensitive, discharging freely at irregular intervals, following pain in the abdomen and pelvis. Latterly the intervals have become shorter. Occasionally at menstruation the condition of the eyes has been aggravated. Five weeks before admission a corneal ulcer developed. She has had the eyes treated a great deal, but without any permanent benefit. Her pelvic troubles have been marked since the birth of a child, four years previously.

Menstruation began at 16; 28-day type; four to five days' duration, profuse. No dysmenorrhœa. She has had four full-term, healthy children, normally; also, two early abortions.

Condition on Examination. Uterus retroflexed and enlarged. Ovaries cystic, enlarged, prolapsed, and tender. The entire conjunctiva of each eye is intensely congested and swollen, a profuse white discharge constantly escaping.

Treatment. Vaginal panhysterectomy was performed. The patient left the hospital on May 6th. Within ten days of operation the eyes became quite normal. There has never been any return of the trouble since.

CASE 2. Miss R., aged 20. Admitted to the Presbyterian Hospital May 29, 1903.

Complaint. Sore eyes, bleeding from eyes and nose, irregular menstruation, headaches, nervousness.

Menstruation has always been irregular since it began at 13, the intervals being two weeks to six months. The duration is usually three days. No dysmenorrhœa.

A year ago the eyes began to trouble her. They became red and tender, discharging freely, and sensitive to light. These troubles have recurred only when the periods have been irregular. At the time the flow should take place, blood escapes from the nose and eyes for a day or two. She menstruated last two months previous to admission. One month ago these phenomena occurred. Ever since they have troubled her considerably, and are now becoming more marked as the time of another period approaches. There is no pelvic pain or leucorrhœa. Treatment of the eyes has been of no value.

Condition on Examination. The uterus is slightly smaller than normal. The left ovary is as large as a hen's egg, cystic, fixed in adhesions. The right ovary is somewhat enlarged and slightly cystic.

Treatment. Abdominal section. Removal of the left diseased ovary. The patient left the hospital June 28th. Within a few days of the operation the eyes became normal.

On September 11th the patient re-entered the hospital, stating that she had had no trouble with the eyes until two weeks ago. Then menstruation was expected, but did not take place. The old eye troubles reappeared. She and her parents requested that the remaining ovary should be removed. Right oöphorectomy was carried out on September 15th. The eyes improved at once, and the patient left the hospital on September 26th; since that time there has never been any trouble.

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CASE OF ABORTION IN A MYOMATOUS UTERUS

MYOMECTOMY AND REMOVAL OF THE UTERINE CONTENTS CARRIED OUT BY ABDOMINAL SECTION

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MRS. F., aged 31, was admitted to the Presbyterian Hospital April 2, 1905, complaining of hemorrhage from the uterus and pelvic pains. Six and a half months previously she gave birth to a child. Pregnancy, labor, and puerperium were normal. Lactation was continued for only three months. Since the labor there was no loss of blood until twelve days ago, when hemorrhage began suddenly, and continued twelve hours. On the morning of her admission she began to bleed profusely, pelvic pain and backache developing soon afterwards.

Menstrual and Sexual History. Began at 14. Regular 26-day type. Duration two days, the flow being profuse. She has been married ten years. There have been five pregnancies, each of which terminated in a normal full-term labor. Her previous health has been good.

Condition on Admission. The patient was somewhat anæmic. On examination of the blood the hæmoglobin was 68 per cent; erythrocytes, 3,752,000; leucocytes, 12,800.

On examination, the vagina was found to be full of blood-clot. The cervix could not be reached by the fingers, being displaced upward and backward by a firm round mass, measuring about four inches in diameter, which bulged the anterior fornix downward. It was firm in consistence, and appeared to be continuous with the anterior wall of the uterus. The latter was as large as the tumor, and was displaced upward and backward. The diagnosis of pregnancy complicated by a fibroid was made.

Treatment. As abortion seemed inevitable and the patient had lost considerable blood, it was decided to empty the uterus. Owing to the inaccessibility of the cervix, it did not seem feasible to carry out this procedure by the vaginal route, and abdominal section was decided upon.

On opening the peritoneal cavity, the diagnosis was found to be correct. The fibroid tumor grew from the anterior uterine wall, having a broad attachment. It was extending downward under the peritoneum, stripping the bladder from the uterus. Two other small fibroid nodules were felt in the fundus.

The tumor was dissected out of its bed, and the latter was incised mesially for a length of three inches until the uterine cavity was opened. The latter contained a four-month fœtus and abundant blood-clot, extensive extravasation in the chorion being present. The uterine contents were removed. A chinosol gauze tampon was placed in the cavity, its end being pushed through the cervix into the vagina, which had been thoroughly cleansed previous to operation. The incision in the uterine wall and the bed of the tumor were then closed by a series of continuous formalin catgut sutures, the raw area being finally covered with peritoneum. The abdomen was then closed. On the second day the gauze was removed from the uterus *per vaginam*. The patient made a good recovery.

Remarks. The fibroid was much softer than usual, and had evidently grown rapidly. If it had been as large at the labor six and a half months previously, it would probably have been discovered or would have caused trouble. Artificial emptying of the uterus through the vagina would have been a very difficult procedure, on account of the displacement of the cervix upward by the tumor, and there would have been much loss of blood. To have awaited spontaneous abortion would have meant delay, loss of blood, risk of incomplete emptying and infection. The abdominal procedure was carried out quickly and with slight hemorrhage.

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APPENDICITIS LARVATA [1]

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EVERY specialist in gastro-intestinal diseases is confronted with a large number of seemingly intractable cases of stomach or bowel disease which refuse to yield to every known method of medical treatment. These cases do not present the classic symptoms of appendicitis; there is almost never any recollection of an attack which is referred to the appendix; but the patients drift on from doctor to sanitarium, and from sanitarium to quack, and from quack to the ever-open arms of the Christian scientist. These patients, after having been unsuccessfully treated by every form of medication or suggestion, are at last set down as hopeless neurasthenics or hysterics. The symptoms of which they complain are manifold, varying from attacks of simple indigestion to severe attacks of diarrhœa. The stomach symptoms are especially prominent in the young: attacks of belching or pain at irregular intervals after eating, alternating with freedom from gastric distress of any kind, in spite of the most liberal diet. A very common symptom, also, is diarrhœa, especially in the morning, and freedom from the same during the rest of the day. Such attacks may occur daily, as I have seen in some cases; e. g., C. M., aged 37. Had no recollection of having had, at any time, appendicitis. Suffered for years with so-called "stomach trouble," which was characterized by diffuse cramping pains in the lower abdomen, followed by several evacuations of the bowels. Oftenest the pains were of such severity as to wake him out of his sleep, and only terminated after two or more bowel movements. These attacks came almost daily; the character of the stool was at first formed, then loose, and never occurred after breakfast. Finally, an attack coming in the middle of the day brought him to a surgeon, who diagnosed the case as appendicitis, and removed a swollen organ firmly bound down by adhesions. The patient, who had tried vainly medical treatment for years before, made a perfect recovery.

A similar case was Mrs. J. O., whose diarrhœas usually occurred daily from nine o'clock till noon; she ran the whole gamut of specialists, even to the point of having her round ligaments shortened, but finally recovered fully after an appendectomy.

In other cases the diarrhœic attacks occurred only at intervals, leaving periods of almost complete freedom from intestinal disturbances; e. g., A. F., a letter-carrier. Had five to six movements, of slimy, mucoid character, accompanied by cramps, chiefly localized in the left hypochondriac region. Palpation disclosed a long swollen appendix, and deep pressure in the cæcal region elicited nausea and pain along the sigmoid. An operation was suggested after six months' medical treatment, combined with bowel massage. The appendix was swollen and firmly bound down by adhesions, but the rest of the bowel was free from all pathological changes. Patient now has only one to two formed bowel movements daily, in the face of a very liberal diet, whereas he formerly was hardly ever free from pain and diarrhœa, even when living on the most easily digestible food. In some cases (J. H. S. and Mrs. Dr. S.) the intestinal disturbance took on the character of a typical mucous colitis with small, hard scybala, often streaked with blood. In the first case the patient lost weight so rapidly that I deemed it advisable to have a long median incision made and the whole bowel explored for a possible neoplasm. Nothing, however, was found, except a long, almost obilterated appendix doubled over and adherent to the cæcum. Patient made a perfect recovery, and now has but one to two formed bowel movements daily, with-

[1] Read before the American Gastro-enterological Society, Boston, June 1, 1906.

out cramps, and has begun to take on weight steadily. The second patient, who refused an operation, made a good recovery under dietetic and medical treatment combined with massage.

Often the cramping attacks are localized so low down in the abdomen as to be mistaken for diseases of the adnexa, and the unfortunate patients undergo tamponade and other local treatment for months and years without results. In many cases, also, operations are performed to remove possible adhesions about the genitalia, but after the operation the patients continue to be the same sufferers they were before. Finally, after a long period of stomach lavage and bowel flushings, and dietings and starving, and electricity and massage, and sanitarium, the doctor puts his uncured and annoying patient in the convenient pigeonhole of neurasthenia, sets down all the symptoms as products of the patient's diseased imagination, and sits back complacently with that satisfactory explanation of his failure.

Ewald, in a paper presented before the Congress of German Surgeons in 1899, was the first to throw light upon this subject. He presented a number of cases which he termed collectively "appendicitis larvata," or masked appendicitis. The cases to which he referred present many of the obscure, unyielding symptoms which I have discussed above; none of the patients gave a history of appendicitis, yet a careful physical examination made it possible to diagnose chronic, subjectively unnoticed appendicitis, careful palpation disclosing a thickened swollen mass in the region of the cæcum. Ewald reports three cases of appendicitis larvata, which are of special interest.

CASE 1. Woman, aged 30 years; was previously treated for nervous complaints. She had pains all over the abdomen, occurring without assignable cause, and was compelled to stay in bed on account of weakness. Examination disclosed a cord of the size of a thumb, swollen, easy to palpate, and very sensitive to pressure, in the cæcal region. Recognized as processus vermiformis by means of inflation of the intestine with air; cæcum swollen, succussion sound over the bowel, similar to that found with atony or paresis of the intestinal muscles. Anamnesis of appendicitis uncertain; operation. Appendix was found swollen, stiff, but not perforated; numerous adhesions to the vermiform process. Two flat tumors, with muddy, bloody, ulcerous contents, were found and evacuated. Recovery complete.

CASE 2. Male, aged 51 years; complained of constipation. For the last six months, continuous griping and drawing pains, especially in right region of the lower abdomen and below the umbilicus. The accompanying constipation was treated with aperients. Bowel evacuation showed some slime and blood. Inflation of the intestine disclosed a swollen appendix. At the operation the vermiform process was found attached to the fascia iliaca, and buried in adhesions. The removed appendix shows no other irregularities. Recovery perfect.

CASE 3. Male, aged 30 years; anamnesis gave no indications of appendicitis. Patient had typhoid eight years before. Last summer, had frequent diarrhœa and considerable loss in weight. Examination disclosed no indication of disease of the stomach; chemistry of the stomach not especially disturbed. Local examination showed an elongated mass in the cæcal region and gurgling sound over cæcum. Operation revealed swelling and flexion of appendix, which contained hard fæces. Perfect recovery.

In conclusion, Ewald naturally says that appendicitis larvata, or perhaps I should substitute the term "ignota" as more appropriate, presents no characteristic symptoms, and that the diagnosis can be made only by excluding gall-bladder, stomach, and pelvic diseases, depending for the diagnosis upon the positive objective findings. At any rate, an operation in each case finally removed all the symptoms for good.

It is, however, not enough to promise a patient, who has submitted to an operation, relief from his troublesome symptoms immediately after the diseased appendix has been removed. In my own personal experience, an operation seldom affords immediate relief. Often many months pass before the patient is finally completely cured.

Armin Huber of Zurich, in an elaborate article on appendicitis larvata, reports a number of cases, some of which are similar in character to those described by Ewald. It is interesting to note that others were mistaken for cholelithiasis, because there was pain and tenderness about the gall-bladder.

One or two of Huber's cases may be of interest.

CASE 1. A man, aged 30 years; the appendicitis was mistaken for biliary colic. First attack came suddenly with violent convulsive pains in the region of the stomach, lasting two hours. The pains started at the pit of the stomach, and spread over the entire epigastrium, with no sensibility to pressure over the stomach. The day after this attack, patient felt well, and attended

to business as usual. About ten months later, another attack of great severity. During the attack there were involuntary evacuations of the bowels; temperature 39° C. per rectum. One day he had convulsions that lasted several hours and then suddenly ceased. The temperature was normal by morning. Slight pains persisted for two days, after which subsidence of symptoms. Three weeks later a recurrence of the attack, with the old symptoms, and again sudden subsidence of the attack. All of the attacks were accompanied by severe vomiting. This time there were griping, drawing pains in the right hypochondrium, commencing at noon and lasting till 5 P. M. On walking, pains increased, and there was vomiting, rigor, and high temperature. In spite of morphine injections, pains continued all night; next morning the temperature was 39° C.; in the evening, 41.2° C. Fever lasted several days, then freedom from pain. About three months later another violent convulsive attack occurred. The next day a tumor was observed *in loco classico*, distinctly discernible, supporting the diagnosis of appendicitis. The perityphlitic tumor disappeared in a few days, with rapid recovery; thirteen days later, operation. The appendix was directed downwards, 5 cm. long; slightly adherent to peritoneum, pelvis, and ileum. It was 3.5 cm. thick. Recovery complete. The first diagnosis in this case was cholelithiasis, because the anamnestic statements pointed to this, and because of the sensibility to pressure in the region of the gall-bladder.

CASE 2. A man, aged 32 years; the appendicitis again was mistaken for biliary colic. There were violent "stomach cramps." Yet on the next day the symptoms disappeared, and patient attended to business as usual. Probable diagnosis of biliary colic was made. About ten months later, another attack, but this time with certain sensibility to pressure over McBurney's point and the stomach. Second diagnosis, supported by a careful anamnesis: appendicitis simplex. Patient claimed that he had similar attack ten years before, though a slight one. Two years after, third attack — always with the same symptoms: pressure, pains in the stomach, no fever. A fifth attack lasted seven hours, and a sixth twenty-two hours. Interim. Operation later. The extirpated appendix showed strong catarrhal changes, with a shiny, bloody contents, and obliteration in the center. Complete recovery.

CASE 3. A man, aged 40 years, in whom cholelithiasis was mistaken for appendicitis; complained of violent pains in the region of the stomach; every time he took liquids the attack came on; no emesis or icterus. The examination of the abdomen showed sensibility to pressure in the right fossa iliaca. Diagnosis: appendicitis simplex. Operation recommended, but not performed, and a few weeks later patient was struck with typic hepatic colic, with high-grade icterus. This shows that in some cases a differential diagnosis between cholelithiasis and appendicitis is impossible.

CASE 5. A man, aged 40 years, who suffered for a long time with pain in the abdomen and stomach. The pains were of a griping character, localized mostly in the epigastrium and in the right hip. The bowels were irregular and constipated. Examination revealed pronounced sensibility to pressure in the right half of the epigastrium. Patient left without treatment. It was learned later that he was stricken with perforative appendicitis. Operation twelve hours later. Death from general peritonitis.

CASE 6. A man, aged 39 years; complained of pains in the stomach, with dyspnœa; abdomen slightly distended and sensitive to pressure; spontaneous pains in the entire epigastrium. Region of the cæcum not painful to pressure. Attacks began with violent pains in the stomach; not severe enough to keep patient at home. However, the general condition became worse, and the patient was compelled to take to bed. A diagnosis of gastric catarrh was made. An exploratory puncture on both sides brought a light, bloody, thick fluid; perhaps a little pus. When transferred to the hospital, he had strong, offensive diarrhœa. The peritonitis symptoms increased. He died ten days after the beginning of his complaint. The autopsy disclosed appendicitis perforativa. In this case the symptoms of pleuritis were so marked that in the hospital the diagnosis was confirmed as pleuritis.

Similarly, Roth of Prague reports two cases of appendicitis larvata which do not present any special features which would warrant my reading them here, except that the diagnosis was only made post-mortem.

Often there are intractable cases of constipation, especially the spastic variety, which are due to an inflamed appendix. Ewald cites a case in which the patient's obstipation yielded to no medical or local treatment. She was treated for years for hysteria, even though, especially during her pregnancies, she had attacks very much like intestinal obstruction, characterized by cramping pains, bloating, and increased peristalsis. Inflation of the bowel showed localized pain and tenderness over McBurney's point, and the operation a long inflamed appendix, adherent to the bowel and right ovary. In this case the operation brought permanent relief from the atony of the bowel and neurosis.

Similarly in one of my own cases, stubborn constipation and extreme neurosis yielded after an appendectomy. Often the pathological changes in the appendix in appendicitis larvata are so slight as to make it difficult to understand why there should be such pronounced subjective symptoms in these cases; yet if we compare them with the pain incident to unloading the bowel and bladder in women who

have either adnexal disease or post-operative adhesions, the symptoms are much more easily appreciated.

Karewski of Berlin, two years previously, discussed cases similar to those reported by Ewald, in which the symptoms were variously interpreted as intestinal atony or obstruction. He failed utterly, however, to recognize the cause, and allowed his cases to come to perforative appendicitis. He reports two cases with stomach symptoms similar to those thus far read, and which I will therefore merely refer to at this time, except as an additional warning to keep appendicitis in mind in obscure stomach cases.

CASE 1. A man, age not stated. The case began with obstruction and meteorism, eructation of gas, nausea; quick recovery. Two months later, renewed attack, with the same symptoms, but in a severe form; the patient could attend to business. A month later became bedridden. Bowels almost completely obstructed. Diagnosis: intestinal atony. A week later, exitus, after operation for peritonitis. Operation disclosed a perforated appendix.

CASE 2. A child, aged 2 years. Two tumors below the umbilicus, on both sides of the bladder; extremely weak and poor; intense meteorism; temporary diarrhœas, followed by constipation. Operation revealed perforated point of appendix resting in a small abscess. Exitus twenty days after operation. Post-mortem showed the processus vermiformis as well as the cæcum covered with tubercular ulcerations, but no intestinal tuberculosis. The rest of the abdominal cavity was divided off from the tubercular nests by an adhesive peritonitis. The intestinal loops were agglutinated, but nowhere was found pus or ulcerative changes. The indications are that the case began as perityphlitis tuberculosa leading to peritoneal tuberculosis.

A point in diagnosis not clearly recorded in any of the cases I have gathered I have found several times as follows: For example, one patient complained of gastric symptoms, bloating, sense of fullness and weight after eating, with vomiting, especially during the menstrual period. Examination of the stomach contents showed slightly increased amount of free hydrochloric acid, otherwise chemically and mechanically negative. Bowels constipated. Loss of weight. Deep pressure over the stomach caused no distress; on the other hand, pressure over the ileocæcal region at once elicited the nausea, belching, and fullness of which the patient complained, without causing any tenderness to be felt over the appendix itself. Patient had an indistinct recollection of some attack in the lower bowel years before, but nothing definite. Deep palpation disclosed a thickened appendix. Its removal caused the subsidence of all the symptoms. Another patient (B. F.), who had chronic diarrhœa for years, and in whom the appendix could readily be palpated, felt pain in the sigmoid region when pressure was made over the cæcum, combined with desire to evacuate the bowels.

In still another patient, E. M., aged 24, who always was in robust health, there were a number of attacks, characterized by pain in the epigastrium and vomiting, followed by a subsidence of the symptoms. Finally, during the World's Fair, there was a severe attack of intractable vomiting, accompanied by cramping pains in the lower abdomen, and on the second day diarrhœa. The attack was then attributed to the St. Louis water. Last Christmas day she was seized with a vomiting attack of such great severity that morphine had to be resorted to to check it. There was at that time no pain in the abdomen. The following day she was again seized with pain and renewed vomiting, and feeling of diffuse soreness over the whole abdomen. Temperature was 101.2°; pulse, 120. The tentative diagnosis of perforative appendicitis with general peritontitis was then made, the blood count running up to 30,000. The symptoms gradually subsided, and a week after the attack there was an easily palpable tumor in the ileocæcal region. Two or three days later there was a sudden evacuation of foul-smelling pus through the vagina, followed by great relief to the patient. The blood count went down to 8,000, and the patient was finally sent home, having refused an operation at that time. The operation, performed a month later, revealed two large abscesses in the abdomen. The appendix was bound closely down to the cæcum and practically obliterated. Since then the patient has been in perfect health. In this case the attention of the attending physician, until the last attack, was never referred to the appendix. Her attacks were diagnosed as gastritis. This again shows the importance of considering the appendix as the seat of disease in all cases of periodical vomiting, espe-

cially when there are long intervals of freedom from any gastric distress in between.

Sometimes appendicitis larvata is taken for "growing pains," as in the case of M. K., who complained of pain in the right side, especially after playing hard or running. When palpation over the appendix disclosed the true state of affairs, the doubting parents could recall several attacks of spoiled stomach, one of which was accompanied by fever and vomiting. An operation in this case, as in that of Lucille P., a little girl, aged 6, who had violent stomach cramps while playing, substantiated the diagnosis and effected a cure. Similarly, Kelly and Hurdon report two similar cases.

CASE 1. Man, aged 27 years, with neurasthenia of long standing; colicky pains and temporary obstruction; frequent similar attacks every two or three months. Examination disclosed no symptoms of appendicitis. The pains concentrating during the attacks in the region of the pylorus and umbilicus; no sensibility to pressure in the region of the cæcum; some emesis. Diagnosis: hypersecretion, with hyperacidity and pylorospasm; finally, violent colicky pains in the abdomen led to the suspicion of appendicitis. Operation revealed a chronic ulceration of the appendix, with considerable induration and several tumors, of which one was near eruption.

CASE 2. Woman, aged 32 years; suffering for six years from cramping pains in the abdomen and obstinate constipation, together with loss of flesh. The disease was diagnosed as genital. Then sudden, strong peritoneal symptoms, with collapse, came on, with fever. Operation revealed chronic appendicitis, with extended old adhesions in the region of the cæcum.

In view of the importance of successfully palpating the appendix in all cases of suspected appendicitis larvata, it will not be amiss to discuss the best methods of so doing. While I do not believe with Hausman and Edebahls that even the normal appendix can be felt in almost all cases that are favorable for palpation, yet it is undoubtedly true that in subjects that are not too stout, and who learn to relax sufficiently, the thickened and diseased appendix can very often be felt; and, what is very important, even if the abdominal walls are too thick to admit the palpating hand deeply enough, it is nevertheless frequently possible to elicit the symptoms which arouse the suspicion of chronic appendicitis by deep pressure. It is, of course, necessary to exclude a spastic bowel and other surrounding structures, but with great care and practice it is frequently possible to diagnose otherwise hidden appendicitis. In hysterical subjects, too, right-sided ovaralgia could readily be mistaken for inflammatory conditions about the cæcum, so this rather common condition must also be carefully eliminated.

If the patient does not relax sufficiently, lowering the head and partially flexing the right thigh often are of great assistance. In some cases examination in a warm bath is very useful. Ewald's recommendation to inflate the bowel seems to me more likely to cause confusion than assistance in palpating the appendix. We must carefully keep in mind, too, that there are a number of conditions which could readily mislead the physician into making a false diagnosis of appendicitis, such as distention of the ileocæcal region with gas, circumscribed contraction of the rectus muscle, and colics due to intestinal parasities, besides the careful exclusion of adnexal and gallbladder diseases.

It must also be borne in mind that there is often good effect from an appendectomy in which a normal appendix is removed. This, according to Kuttner, is probably due partially to suggestion, partially to rest and proper diet, and in some measure, perhaps, to the division or certain nerve trunks. There is, however, a much more potent reason than the ones just enumerated for the wonderful effects following the removal of a diseased appendix; for whereas these might hold in conditions simulating appendicitis, yet there are real anatomical reasons for the favorable effects cited in the cases quoted.

Lennander has shown that most of the pain in peritonitis is due to an accompanying lymphangitis; that the adhesions cause pain only when put on stretch, through distention of the bowel. This explains the cramping pains incident to chronic appendicitis, especially when the bowel above is filled with gas or stool. The lymph-vessels of the appendix do not press upon sensory nerves until the lymphangitis extending from the appendix reaches the perilymphatic tissue and lymph-glands surrounding the aorta. This also explains the early localization of pain about the epigastrium in appendicitis. The pains in the region of the appendix only come later, when there is rubbing

between the parietal and visceral peritoneum. Analogously, Kraft reports a case of left-sided appendicitis in which the attack began with pain in the epigastrium and vomiting, spreading some hours later, and localizing in the left lower abdomen and lumbar region. The post-mortem showed left-sided gangrenous appendicitis. It is therefore with good reason that Lenzmann warns against having the attention detracted from the appendix by general though not especially characteristic pains in the abdomen. There may be pain about the umbilicus, emesis and cramps, with a diseased appendix which causes no subjective symptoms to the patient even on deep palpation, yet an operation always shows characteristic changes. The projecting pains in appendicitis larvata are probably due to the anastomosis of the inferior mesenteric plexus with the plexus solaris. As Müller of Aachen suggested, after hearing Lenzmann's paper, the pain is sometimes due to a lymphangitis ascending to the ribs. It is a common occurrence to find that pleurisy begins with cramping pains in the abdomen and vomiting. So in appendicitis, we may find the reverse true. Yet in appendicitis, as in cholelithiasis, ureteral colic, etc., the subjective symptoms of the patient are a poor guide to the physician in the correct localization of the disease. An important diagnostic point emphasized by Nothnagel is stiffness of the rectus and increased peristalsis above, plus the objective findings.

PATHOLOGY

In many of my cases there was found complete obliteration of the appendix; in others there were several strictures without complete destruction of the lumen of the organ. The symptoms in no way were commensurate with the morbid changes in the diseased organ, and often the greatest distress and discomfort occurred in cases in which the appendix showed very slight changes.

Dr. O. L. Schmidt kindly furnishes me with reports of three cases of appendicitis larvata, in one of which, although there were attacks of intense pain of a colicky nature, deep in the epigastrium and back, with belching, and in which the physical examination was absolutely negative, yet an exploratory laparotomy held five months after the last of the attacks showed such slight adhesions around the appendix, that it was hardly convincing to the operator that the real cause of the colics had been found, but, nevertheless, the patient made an uneventful recovery without any recurrence of pain for over a year.

In my own cases, also, I have found the most pain was present when there were the most adhesions, especially when the appendix was doubled over the cæcum and completely bound down. This class of appendix was oftenest found in cases of mucous colitis and diarrhœa with cramps; whereas stomach symptoms were oftenest associated with a long thickened appendix, which hung freer in the peritoneal cavity. This kind of appendix is naturally also the most dangerous, and can readily perforate, whereas the string-like, narrowed variety is more annoying from its reflex symptoms than liable to lead to death from general peritonitis.

While no claim can be made that appendicitis larvata is a disease for itself, and with the full knowledge that it is merely a name for unrecognized chronic appendicitis, yet it is necessary to know that there are many appendicites taking atypical forms, the failure to recognize which is often responsible for the death of a patient who might otherwise have been saved by a correct diagnosis and operation. We are all too prone to call diseases we cannot understand "nervous" diseases, for want of a better term. A more honest name for some of them would be "diseases of which we do not know the cause." Appendicitis larvata and cholelithiasis account for many so-called nervous dyspepsias; but, perhaps, as our knowledge broadens we may be able to account for the rest. Malingerers and neurotic individuals may enjoy the distinction of having various ailments, but the fewest want to have their digestion interfered with and the food they like best forbidden them for the glory of being sick; besides, a person would have to be very neurotic indeed to find real enjoyment in cramps and diarrhœa. We must try to keep clearly in mind the important fact that we may do patients an injustice; that if we are not sure that the symptoms of which the patient complains are purely nervous ones, we may always satisfy ourselves by the relatively harmless

procedure of an exploratory laparotomy, and thereby save the patient an intense amount of suffering without endangering his life. The good internist is the one who best sees his limitations. It in no way detracts from the glory of the medical man if he adds to his diagnostic skill the mechanical aid of the surgeon.

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RUSH MEDICAL COLLEGE

Department of Gynecology

PRIMARY MALIGNANT TUMORS OF THE INFANT UTERUS

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MALIGNANT tumors have been found more frequently in the infant genitalia of the female than in those of the male.

Steffen (1) collected cases of malignant tumors of the genital organs of the female infant, the ages varying as follows: Under 1 year, 5; 1 to 2 years, 7; 2 to 6 years, 10; 6 to 10 years, 4; 11 to 14 years, 7.

They are found to increase greatly after the age of puberty. Nearly half (15) of the 33 cases were primarily of the vagina, and of this number 13 occurred after 6 years of age. In the 15 primary malignant growths of the vagina there was secondary involvement of the uterus in 4. In 6 of the 33 cases, the growths, when first seen, were too far advanced to determine whether the growth was primary in the uterus or vagina, both being extensively involved.

Steffen records 5 cases of primary malignant tumors of the infant uterus, of which 3 were sarcomata and 2 carcinomata. In addition to this number, there were 3, all sarcomata, in which both the uterus and vagina were involved. The ages of these cases varied from five months to two years, and all were thought to be congenital.

The anterior lip of the cervix is the site of predilection (3 cases). Extension of the growth is first to the anterior wall of the vagina and bladder or upward to the body of the uterus. Beyond these sites the growth extends, as in cancer of the matured uterus, to the broad ligaments, to the iliac and lumbar glands, and to the peritoneum. Purulent pyelitis may result after involvement of the urethra and bladder. General metastasis has been observed. From the time the vagina is attacked, the extension of the growth is more rapid.

Steffen believes these growths to be congenital in the majority of cases. This fact is illustrated by the case of Alban Doran (2), in which a carcinoma of the ovary was found in a seven months' fœtus; also by the case reported by Demme (3), where was found a congenital fibrosarcoma ovarii in a five-year-old girl, and again by a case reported by F. Ahlfeld (4), of a congenital fibrosarcoma vaginæ.

Benign congenital tumors are known to become malignant after attempt at radical removal. (Steffen.)

As for the pathology and diagnosis of malignant tumors of the infant uterus, there is little

variation from malignant growths of the mature uterus.

A doubt naturally arises in our minds as to the correctness of the diagnosis in the cases reported as carcinoma; yet, coming from such good authority, we are bound to accept them. In sarcoma of the cervix in infancy we find that rare type known as sarcoma botryoides mucosæ-cervicis in the form of pedunculated translucent grape-like bodies protruding into the vagina.

The symptoms are those common to malignant growths of the adult uterus. In three cases precocious menstruation was observed. Continuous hemorrhages persisted for two or three years in a case of cancer of the cervix and anterior wall of the vagina recorded by Ahlfeld.

The prognosis is usually fatal. One recovery is reported by Agnus Bluhin (9), following operation for a sarcoma botryoides cervicis.

Following are abstracts of the eight recorded cases, to which is added one which I have recently observed.

CASE 1. Reported in *Virchow's* (5) *Archives*, bd. xcii, h. 1. Age less than two years. A nodular sensitive tumor extended three fingerbreadths above the symphysis pubes. Death from cachexia. Growth was primary in the fundus uteri and extended into the bladder. Microscopic diagnosis: Sarcoma.

CASE 2. Reported by L. Pick (6), in *Archives f. Gyn.*, bd. xlvi, h. 2. A primary carcinomatous growth of the cervix, with gangrenous polyps protruding into the vagina. Immovable secondary growth, the size of a man's fist, in the lower abdomen. Post-mortem section showed growth extending to the vagina and cavum uteri, together with general metastasis, pyometra, and distended bladder. Death ascribed to chronic peritonitis.

CASE 3. Gynghofner (7) reported the case of a girl, aged 8 years, who for two or three years had almost continuous hemorrhages from the genital tract. On the anterior lip of the cervix was a tumor the size of a hazelnut, reddish gray, irregular, and bleeding freely to the touch. The growth extended into the anterior wall of the vagina. Diagnosis: Medullary carcinoma.

CASE 4. Markovic (8) reported the case of a girl, 5 years of age, in which there was a sarcoma the size of a man's fist on the posterior wall of the uterus, which extended to the surrounding structures.

CASE 5. Agnus Bluhin (9) records the case of a girl, 11 years of age, with sarcoma botryoides mucosæ-cervicis. Operation; recovery.

CASE 6. Case reported by Wells, 13 years of age, in which menses were suppressed for eight months, then followed hemorrhages from the uterus, which persisted until two weeks before death. A painless, immovable tumor extended to the umbilicus. A second tumor was attached to the posterior wall of the uterus. The uterus was dragged upward by a tumor of the fundus. Diagnosis: Cancer of body of uterus, with secondary extension to the bladder.

CASE 7 Marsh. Diagnosis: Sarcoma of uterus, vagina, and rectum.

CASE 8. Ahlfeld (10) records the case of a girl, $3\frac{1}{2}$ years of age, greatly emaciated. Two tumors, together measuring 25 cm. in diameter, protruded from the vulvar outlet, and a third tumor lay between these two. Above was a space filled with a foul secretion. Entire vagina was filled with polyps. Large polyp attached to the fundus occupied the cavity of the uterus. Tumor size of walnut found in posterior wall of the bladder. Growth extended to neighboring organs. Diagnosis: Fibrosarcoma.

CASE 9. The following case was seen by me in consultation with Dr. C. M. Floyd of Steubenville, Ohio, who later kindly sent me the post-mortem specimens for examination. The child died at four years of age. She was 18 months old when a yellowish vaginal discharge was first noticed, and two months later grape-like bodies were seen to protrude from the vagina, and three months from this time three ounces of these bodies were scraped from the anterior lip of the cervix by Dr. Floyd. No microscopic examination was made of the growth. No tumor mass was then observed in the pelvis. Within six weeks similar masses again protruded from the vulvar outlet, and three months later the growth was again removed from the anterior lip of the cervix. This operation was performed by Dr. Werder of Pittsburg, who observed numerous small secondary nodules upon the vagina and vulva. The uterus was slightly enlarged, and in the left broad ligament was a firm, immovable mass the size of a small orange. The inguinal lymph-glands were enlarged on both sides.

About one year later I saw the child together with Dr. Floyd. She was extremely emaciated. The abdomen was greatly distended, and the superficial veins were prominent. The entire abdomen seemed filled with a firm nodular tumor, and from the vulvar outlet protruded a grape-like mass of tissue. The inguinal glands were enlarged on either side.

A clinical diagnosis was made of sarcoma botryoides cervicalis with secondary involvement of the peritoneum.

About six months later the patient died, and the tumor mass, including the intestines, bladder, vagina, rectum, uterus, and its appendages, were sent me by Dr. Floyd.

Description of the Gross Specimen. The entire tumor mass weighed four pounds, and was about the size of a man's head. It was grayish in color,

homogeneous, and of firm consistency. Its surface was nodular, and loops of bowel were matted to its surface. It was quite impossible to determine the relation of the tumor to the abdominal viscera. The uterus was of normal size. The great mass of the tumor projected from its posterior wall, and not only filled the cavity of the pelvis, but that of the abdomen as well. No tumor was found attached to the cervix. The bladder could not be recognized in the mass, and the rectum was compressed but not infiltrated by the tumor.

The entire peritoneum was studded with nodules.

The macroscopic diagnosis of the specimen was primary sarcoma botryoides cervicalis with secondary involvement of the pelvic connective tissue and general peritoneum. I regret that a more detailed report of the post-mortem findings is not obtainable.

The microscopical examination showed a typical small spindle-cell sarcoma.

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RUSH MEDICAL COLLEGE

Department of Surgery

THE HEALING OF SUPPURATIVE APPENDICITIS WITH CALCIFICATION

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WHENEVER necrotic tissues are left in the body under such conditions that absorption cannot take place, they become, almost invariably, infiltrated with calcium salts. Old accumulations of pus that have become more or less inspissated, or the necrotic or hyaline walls of old abscess cavities, are particularly favorable sites for such processes of calcification, which may become very extensive, as seen in the calcification of sterile residues from empyema or pyopericardium. One would expect, therefore, that the not infrequent spontaneous recovery from perityphlitic abscesses following appendicitis might often be followed by the calcification of the remains of the abscess. In view of the fact that we have recently observed two such cases, one clinically, the other at autopsy, it seems probable that such an occurrence is not rare, but the literature seems to be quite devoid of specific references to the subject. The standard texts and treatises on appendicitis do not mention calcification of appendiceal lesions, except Deaver, who states: "It cannot be denied, however, that, under exceptional circumstances, absorption of pus may occur. This is, nevertheless, a very rare event, and ensues only when the abscess is very small and the virulence of the contained bacteria very slight. Under such circumstances, it generally becomes sterile, then inspissated, and there may result the formation of a thick mass of indurated connective tissue, which rarely has been found the seat of calcareous infiltration." Among the innumerable references to the subject of appendicitis in the Index Catalogue of the Surgeon-General's Library, and in the Index Medicus, none has been found that seemed to refer to the topic of calcification as a sequel of this condition. In view of the lack of discussion of this subject in the literature, and the evident practical importance of the calcification of healed perityphlitic lesions, we wish to put on record the two following cases:

CASE 1. A man, aged 52, who died in the Cook

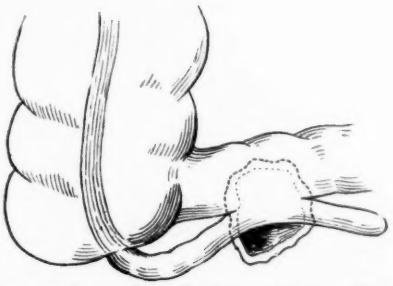

Diagram of appendix and calcareous mass. Case 1.

County Hospital, of acute tuberculous pleuritis and chronic nephritis. There was nothing stated in his history concerning any previous abdominal difficulty, and there were no symptoms referable to the conditions found at autopsy. On opening the abdominal cavity, nothing abnormal was found, except in the vicinity of the appendix. Here was found a mass of rather dense fibrous adhesions binding the head of the cæcum, the lower end of the ileum, and the vermiform appendix firmly together. A hard, calcified mass could be readily palpated in the adhesions. The other adjacent serous surfaces were not adherent to these structures. On dissecting out the appendix it was found to be patent for a distance of about 1.5 cm. from the cæcum; at this point it became obliterated by a dense fibrous constriction, which extended for a distance of 2 cm., corresponding to the site of the calcified area, and also to the distance for which it was adherent to the ileum at a point about five centimeters above the ileocæcal valve. Beyond this point the distal portion of the appendix was free, and of about normal diameter, but contained no lumen. The ileum at the point of attachment was somewhat distorted by the adhesions, but not at all constricted, and the mucous membrane was intact at the point of adhesion. Corresponding to the obliterated part of the appendix, lying immediately posterior to it, was a disk of calcified material 2 cm. in diameter, ½ mm. thick, concave, resembling in form the end of an egg-shell, with its concavity directed towards the point of attachment of the appendix and ileum. It was entirely inclosed by adhesions surrounding the bowel at this point.

Apparently at some previous time this person had suffered from an appendicitis, with formation of an abscess. This abscess had ruptured into the ileum and discharged the greater part of its contents into the bowel; the wall of the abscess, or at least the lower part of it, had then undergone calcification. Because of its location, and the fact that there were no adhesions to the surrounding surfaces, no trouble had resulted from either the calcified mass or the adhesions.

Case 2. At noon on September 24, 1905, a dairy superintendent, aged 35, was seen in consultation, the following history being obtained: About 32 hours before, while lifting a heavy milk-can from a vat, the top of which was level with the floor on which he was standing, the patient was seized with a sudden sharp cramping pain, most intense in the region of the umbilicus. Although the pain was very great and accompanied by some nausea, he continued his work for two hours, when vomiting began and he went to bed. From that time until noon of the following day, when consultation was asked for, the pain continued except for a few hours during the night, when it was relieved by the hypodermic administration of a quarter-grain of morphine sulphate. He continued to vomit at intervals, although taking nothing by mouth, except small quantities of cracked ice. From the onset of the pain, neither gas nor fæcal matter had passed from the bowels, although repeated high enemas were given.

Four years previously the patient had passed through a severe attack of appendicitis, which lasted two months. During this attack a mass developed in the region of the appendix, very tender and slowly increasing in size, until it suddenly disappeared, with immediate marked relief of symptoms, which caused the attending physician to conclude that the abscess, which he had been confident was present, had ruptured into the intestine. An operation was not considered at that time, because of a rather severe myocarditis which had existed for years, and had caused several attacks of syncope. During the past year the patient had two attacks of intestinal obstruction. The first one caused great pain, and was complete, until relieved at the end of twelve hours by cathartics. The second one, occurring a few weeks before the present attack, did not cause as much distress, and lasted only a few hours. Early in September the patient's application for life insurance was rejected on account of his myocarditis. Examination showed a well-nourished man, evidently suffering great pain, who realized his serious condition but was not mentally depressed. The skin was rather cold and moist, and the forehead was covered with beads of sweat, but there was no expression of anxiety on the face. Temperature 99°; tongue dry, but not coated; pulse weak and irregular, and varied between 108 and 130. The heart was slightly enlarged, but no murmurs could be detected. The abdomen was somewhat distended, very tense, and everywhere tympanitic. There was slight general tenderness, and localized tenderness, a little to the right of the umbilicus, where a poorly defined mass could be felt. Auscultation revealed weak peristaltic sounds at long and irregular intervals. Examination of the rectum showed it to be empty, and no mass could be felt through its walls. During the examination the patient vomited a quantity of clear yellow fluid without fæcal odor. A large enema was given, with the patient's hips elevated, but the water returned clear and colorless.

Diagnosis. Intestinal obstruction, probably due to a band of adhesions resulting from the previous attack of appendicitis, causing strangulation of a loop of intestine. Immediate operation having been advised

and consented to, the patient was moved to the Presbyterian Hospital, where the operation was commenced about 3:30 P. M., under ether-anæsthesia.

Operation. The incision, about five inches long, was made through the outer border of the right rectus, on a level with the umbilicus. Enormously distended intestines forced themselves out through the incision and were covered with hot towels. A finger introduced in the direction of the appendix immediately hooked up a very firm fibrous band, almost as large as a lead-pencil in diameter, and running from the region of the appendix upwards towards the vertebral column. A loop of bowel was seen to be caught under this band, the proximal side of the loop greatly distended, and the distal side collapsed. The strangulated loop, released by cutting the band, showed no evidence of gangrene. As the relief of this strangulation seemed to overcome the distention of the bowel for only a short distance, further search was made, which showed about two feet above the strangulated area, a coil of intestine, which had become adherent to itself to form a loop, between three and four inches in length. Above this loop the gut still remained distended, showing that the short loop was also a cause of obstruction. At the place of adhesion could be felt a stony hard disk which seemed to be incorporated in the wall of the bowel. The lumen of the bowel making up both ends of the loop was much contracted at this point. The mesentery of this coil of intestine had attached to it adhesions which ran to the right iliac fossa. On attempting to cut through the hard disk which formed the adhesion of the bowel, it was found to be calcified, and as it infiltrated the bowel-wall down to the mucosa, in freeing the gut a defect in the wall of the distal end of the loop was caused, between 1 and 2 cm. in diameter, which was closed by a double row of Lembert sutures of linen. The disk was left in the wall of the proximal end of the loop, as its removal would have left a large defect in the wall of an already contracted intestine, the repair of which would have left a serious degree of stenosis. It was impossible to return the greatly distended intestines until they had been punctured in three places with the knife so as to allow escape of gas and contents, each puncture being closed with Lembert sutures of linen. As the patient was in great shock, the abdominal wound was closed with through-and-through sutures of silk, except at the lower angle, where a large drain of gauze and rubber tube was left.

The patient died 26 hours after the operation. The pulse, which was almost imperceptible when he left the table, remained weak and irregular and about 140 to the minute. That the bowels did not move after the operation was apparently due to paralytic ileus from the enormous distention, as during the operation when the obstruction was relieved the empty bowel remained flaccid and did not respond to stimulation.

It is to be regretted that an autopsy was not possible.

It seems clear that during the patient's attack of appendicitis four years ago, the coil of bowel forming the short loop we found at the operation made up part of the wall of the abscess cavity, and that perforation of the abscess took place at the point where the intestine was found adherent to itself; that as the abscess drained into the bowel, its cavity became smaller and smaller, until finally all that remained was the portion that formed the calcified nodule found infiltrating the bowel-wall; that if calcification had not taken place, this short loop would have been slowly done away with by the gradual stretching out of the adhesions. It seems that the patient's two former attacks of obstruction were caused by distention of this loop, or possibly by torsion of it. The last attack was undoubtedly caused by his exertion of lifting, causing a loop of intestine to slip under the firm band of adhesions, which caused strangulation, and the ensuing distention caused a second obstruction at the short loop formed by the calcareous adhesion. The fact that the abscess took a much more chronic course in this case than is usual in appendicitis may account, in part, for the calcification which occurred in its wall.

Calcification of the wall or contents of an appendiceal abscess may be of practical importance in a number of ways. 1. The presence of the calcareous mass precludes the normal removal of bands of adhesion through the traction exerted by peristaltic movements; in our second case this seems to have been a very important factor in determining the persistence of the adhesion that later led to intestinal obstruction. 2. The presence of a calcareous mass may make it difficult or impossible to break up adhesions without opening the bowel; this difficulty was also presented by our case. 3. It might also happen that such a calcified mass could lead to error in making an X-ray examination for ureteral calculus.

RUSH MEDICAL COLLEGE
Department of Surgery

INJURIES TO THE URETHRA—TRAUMATIC STRICTURES, AND THEIR RATIONAL TREATMENT

From Prof. J. B. Murphy's Clinics

By J. M. NEFF, M. D., and V. L. SCHRAGER, M. D., Chicago

INTRODUCTION

THE present article is limited to injuries of the urethra produced from without, principally crushing injuries from falling astride hard objects, or from kicks, blows, etc., to the perineum. Crushing injuries to the urethra are usually seen first by the general practitioner, and not by the surgeon, and, as such, the subject is of general interest.

We consider it unnecessary to speak of the medicinal treatment, which is absolutely valueless, and while the mechanical treatment has been in favor even with the surgeon, it must be condemned if it become a general procedure. The introduction of sounds and catheters into a lacerated urethra will, almost invariably, be followed by infection at the point of laceration and surrounding tissues, notwithstanding the aseptic conditions under which the catheterization is performed. The general practitioner has been accused of inefficiency and carelessness in sterilizing his instruments. While this is true to some extent, it will be seen later, when speaking of the bacteriology of the urethra, that a most aseptic instrument may cause infection because the traumatism produced by the passage of a sound increases the virulence of the urethral flora, which, normally, is in a semi-saprophytic state of life. On the other hand, the general practitioner, with less ability in the handling of sounds, especially when the urethra is inflamed and œdematous, will cause false passages, increase the liability of stricture at the point of laceration, and predispose the deep structures to infection and its consequences.

It is our object to urge early surgical treatment in these cases, and rational treatment of the late consequences, as stricture, fistula, etc.

The expression "traumatic stricture" must disappear from the medical vocabulary if the intervention in acute cases be immediate and rational.

BACTERIOLOGY OF THE NORMAL URETHRA AND OF THE INJURED OR DISEASED URETHRA

Most of the genito-urinary specialists and bacteriologists agree that the normal urethra contains several varieties of bacteria. Their vitality is subnormal or in a semi-pathogenic state. A traumatism to the urethra, within or without, will increase the vitality of these micro-organisms, which will have a pathogenic effect, either local or general.

Austerlitz (1) was unable to find pathogenic bacteria in the urethra of healthy women. He found, however, many micro-organisms, which he called "non-pathogenic."

In 1899, Cottet (2) published twelve cases of spontaneous periurethral abscesses due to anaërobic microbes. In some cases, anaërobic were associated with aërobic.

H. Pfeiffer (3) found pseudo-diphtheria bacilli in the normal urethra. According to him, they were identical with the "syphilis bacilli" of Joseph. Examining twenty-four normal urethras of young men who never had any venereal diseases, he found thirteen varieties of bacteria, which he divided into: (*a*) Constant; and (*b*) Non-constant. Among the constant there were: 1. Diphtheria group; 2. Streptobacillus urethræ; 3. Cocci, most of them in masses, resembling staphylococci. Pfeiffer states that the posterior urethra is not free of bacteria. The pseudo-diphtheria bacilli and streptobacillus urethra are responsible for post-blennorhœic urethrides and cystides.

B. Asakura (4) of Tokio examined 112 cases of normal urethras. He found streptococcus 14 times, or $12\frac{5}{10}$ per cent, and states that they

are saprophytic in the normal urethra, but that their vitality can be increased.

PATHOLOGY

While the extent of laceration to the urethra is in proportion to the degree of trauma from without, it should be borne in mind that even very slight or insignificant trauma to the perineum is liable to produce considerable damage. This is easily explained by the proximity of urethra to the pubic symphysis.

A trauma to the urethra may involve only the urethral canal and produce a partial or complete laceration of the same, or concomitant with it the spongeous and cavernous bodies may be injured. As said, laceration may be partial or complete. In the latter case, the ends of the urethra may widely retract. The injury will naturally produce effusion of blood, which, not being able to escape through the anterior urethra or into the surrounding tissues, will produce clots, thus increasing the obstruction to the passage of urine. Shortly after the rupture there is an extravasation of urine, causing swelling and infiltration of the tissues and subsequent infection leading to sloughing of the respective parts.

In some cases there is a possibility of severe crushing and laceration, either of the corpus spongiosum or cavernosum without any laceration to the urethra. The former may be injured by passage of sounds and catheters after the laceration. The most serious complication in traumatisms to the urethra is the septicæmia or septico-pyæmia from infection or thrombosis of the venous plexus of the corpus spongiosum. There are cases on record in which an injury or an infection of the corpus cavernosum was followed by death. The same thing has been observed in cases where children have been operated for vascular tumors situated on the face. This is, probably, due to a septic thrombosis of the respective veins.

ÆTIOLOGY

The most common ætiologic factor in lacerations of the urethra is falling astride upon hard objects, particularly upon sharp or pointed objects, and especially if the patient falls with legs extended. In G. Schmidt's collection of 88 cases of traumatic strictures, fractures of the pelvis were responsible in 11 cases, penetration of sharp points in 2 cases, sudden fall upon blunt objects in 26 cases; the rest of the causes were variable.

At the time the bicycle was in vogue, injuries to the urethra were not uncommon. G. A. Walther (5) collected, in his monograph, 11 cases of injuries to the urethra from bicycle-riding, produced by forced pressure of the perineum against the saddle.

The portion most frequently involved is the perineal segment: 1. Because of its fixity; 2. Because of the possibility of complete compression between the symphysis and a solid object. The pendulous portion is seldom injured, on account of its extreme mobility, which always avoids solid objects. Erection favors injury. If the latter comes from the side, then the urethra is pressed between the solid object and the ramus.

The urethra may be ruptured partially or completely. In incomplete rupture, it has been a matter of discussion which wall is most frequently involved. According to Poncet and Ollier (6), it is the superior or anterior wall. Most of the writers agree, however, that the injury involves most frequently the inferior or posterior wall. The direction of the incomplete rupture is usually oblique (Poncet and Ollier).

SYMPTOMS

Pain and tenderness in the perineum are naturally the first symptoms complained of. Soon after the injury, or almost immediately after, if the laceration is extensive, blood appears at the external meatus. When this occurs during urination, it is pathognomonic of urethral rupture.

Swelling and discoloration of the skin at the site of injury develop rapidly, and are due primarily to hemorrhage from the very vascular periurethral structures, particularly the corpus spongiosum and bulb. Later, after attempts at urination have been made, the swelling is greatly increased by the infiltration of urine into the cellular tissue, and still later, if instruments or catheters have been passed into the urethra, by gangrene and suppuration. This is the inevitable outcome of such procedures, even where antiseptic and aseptic precautions have been taken.

Retention of urine is an almost invariable

symptom of rupture, and is noticed a few minutes or several hours after the injury, depending upon whether the bladder is full or empty at the time. The overdistention of the bladder causes considerable pain in the suprapubic region, which later is experienced in the perineum as well, when the urine begins to escape into the cellular tissue. If the rupture is not complete and the lumen of the urethra not entirely obstructed, a few drops of urine may be forced out of the meatus during attempts at micturition, but the larger quantity passes through the rupture.

Symptoms of sepsis and severe intoxication may finally set in on the second or third day, particularly when the trauma has been combined with instrumentation. Chills, high temperature, sweats, rapid pulse, are the sequence of infection. The prognosis is generally fatal without surgical intervention, yet some cases recover without any treatment, because of the sloughing of the crushed and infiltrated perineal tissues, which establish a natural drainage. In many cases, where the urethral laceration is slight, the symptoms, after persisting for twenty-four to forty-eight hours, subside, and the patient recovers. Almost always, however, the cellular, traumatic reaction is followed by a loss of elasticity of the canal at the point of injury, the respective segment being replaced in time by connective tissue, thus producing a narrowing of the canal. Such strictures are usually short, single and annular, rarely tubular or multiple. Occasionally, the narrowing of the canal is so slight as not to inconvenience the patient at all; generally, however, the patient develops symptoms after months or years, and finally seeks medical aid.

As stricture is the usual outcome of trauma, we deem it necessary to give it special consideration in a separate chapter.

STRICTURES

The generally accepted classification of strictures is: (*a*) Spastic strictures; (*b*) Inflammatory strictures; (*c*) Organic strictures.

As stated in the beginning, we will deal only with the traumatic or organic strictures. Some writers add to the above classification infantile and senile strictures. The infantile strictures may be either congenital — that is, due to some congenital deformity of the canal — or traumatic. The senile strictures are due, according to Hermann and Kleinwachter (7), to fibrosis of the canal.

From an analysis of Christen (8) 91 per cent of strictures were gonorrhœic, 3 per cent were traumatic, and the rest were due to other causes; 85.5 per cent were single, 14.5 per cent were double, and 1 per cent were triple. In 27 per cent the stricture was situated in the bulbous region; in 6 per cent, between the membranous and bulbous region; the rest were in other parts.

Strictures in women are more frequently due to trauma than to gonorrhœa (9).

In 67 per cent of the cases the stricture was situated, according to Thompson, in the bulbous part.

SECONDARY CHANGES FOLLOWING A STRICTURE

The urethra behind an old stricture becomes very thin; the caliber is very much enlarged; the mucosa is deeply inflamed and secretes continually a mucoid substance. The muscularis of the bladder is considerably hypertrophied and its capacity greatly enlarged if retention is marked.

Secondary changes may occur in the upper urinary tract after long-standing retention and infection of the lower genito-urinary tract. The ureter, pelvis of the kidney, and kidney itself may be aseptically enlarged or transformed in sacculated pus-cavities — pyonephrosis.

INFILTRATION AND EXTRAVASATION OF URINE

If a small ulceration exist behind a stricture, an infiltration of urine will take place. To understand which tissues will be infiltrated by urine, it is absolutely necessary to have a clear knowledge of the anatomy of the perineum. In ordinary cases the urine penetrates the penis, scrotum, and abdominal teguments. This is explained by the attachment of the deep layer of the superficial perineal fascia to the surfaces and rami of the pubis, which does not allow the urine to escape into the thighs, nor into the perineum or perirectal tissues, because of the union of the two layers of the Buck fascia. According to Lydston (10), extravasation takes place in the membranous urethra between the layers of the triangular ligament because of lack of support on the part of surrounding

tissues. The urine travels along the anterior layer of the triangular ligament at a point where it is penetrated by the urethra. In case of perforation of Buck's fascia, or in cases where it gives way, the urine, by gravity, will penetrate into the thighs and perirectal tissues.

Occasionally the extravasation may take place between the two layers of the triangular ligament, and if they give way, the urine will penetrate the cellular tissues of the pelvis and travel along the spinal column, and sometimes even penetrate the peritoneal cavity. The type of extravasation above described is found in laceration of the urethra. In case of stricture, the process of extravasation is a little different. At first there is stagnation of urine, which becomes septic, irritates the mucosa, and finally ulcerates it. The penetration of urine is slow, and the septic urine forms a peri-urethral abscess, which produces gangrene of the penis and scrotum.

According to Lydston, healthy urine is harmless when injected into the cellular tissue. Decomposed urine or septic urine is harmful, producing cellulitis, abscess, gangrene, and sloughing of the parts.

DIAGNOSIS

The diagnosis of rupture of the urethra is usually easy, as the classical symptoms are nearly always present, but it is not such an easy matter to determine the extent and severity of the injury and whether or not a given case will go on to recovery without operation. Even when the urethra is not severely injured, it may be impossible to pass a catheter into the bladder, because of the swelling and infiltration of the peri-urethral tissues. And in many cases where this is attempted, infection may result. It may therefore be laid down as a rule that the instrumentation of the urethra is never permissible in these cases, and that we must be satisfied to make the diagnosis of urethral rupture without catheterizing, and on this basis advise perineal section in all cases of ruptures of the urethra.

REGENERATION OF THE URETHRA — CLINICAL AND EXPERIMENTAL

The autopsies of Francke and the numerous experiments on dogs of Ingianni have demonstrated beyond a doubt that regeneration of the urethra is possible.

Berg (11) states that the urethral epithelium has a great tendency to proliferate along freshly divided tissue.

Ingianni (12) experimented on 22 dogs, which were killed in from 4 to 132 days after the operations. He comes to the following conclusions:

(*a*) Regeneration of small or longer portions of the urethra can experimentally be obtained.

(*b*) Mucosa and cavernous bodies regenerate; muscularis, however, is never reproduced.

(*c*) Regeneration takes place from the granulation tissue which surrounds the stumps of the urethra.

(*d*) Regeneration is much more rapid and perfect if the inflammation is slight.

(*e*) If a gap exist between two urethral stumps it will be lined, in the course of time, by urethral epithelium originating from the stumps, thus forming a new canal. The latter, however, is deprived of muscularis.

INDICATIONS AND CONTRAINDICATIONS FOR OPERATION

It is generally agreed that intervention is desirable and successful if the urethral gap is not greater than three centimeters. This was practically the conclusion at which the Congress of Surgery of Paris arrived in 1900. Where more than one stricture is found, covering a distance of more than three centimeters, the attempt is not justifiable. Single, annular strictures are fit for this procedure. Elastic strictures, which contract immediately after dilatation should be treated by excision. Valve-like or diaphragmatic strictures, granulations leading to hemorrhage, pain produced by instrumentation, permanent fistula back of the stricture, urinary retention, cystitis, are all indications for operation.

TREATMENT

In acute cases, some surgeons are expectant, at least, for twelve hours. In Mikulicz's clinic, in fresh traumatisms to the urethra the attitude used to be, first to wait and watch the patient; if urinary retention was present, then the patient was catheterized with a metal catheter; finally, if the urinary retention continued, and there

was infiltration of urine in the perineum, a permanent Nélaton catheter was introduced.

In acute cases, Dr. Neff is in favor of immediate perineal section, and if possible, suture of the lacerated segments; introduction of a permanent catheter, and perineal drainage at the lower angle of the wound.

As traumatic urethral strictures are more commonly encountered by the surgeon than fresh lacerations of the urethra, we will consider briefly the various methods employed for the cure of strictures.

1. Bloodless operations.
   - A. Dilatation.
     - (*a*) Gradual.
       1. Temporary.
       2. Permanent.
     - (*b*) Forced.
       1. Forcible catheterization.
       2. Dilatation by dilators.
   - B. Cauterization.
   - C. Electrolysis.
2. Bloody operations.
   - A. Internal urethrotomy.
   - B. External uretrothomy.
   - C. Urethrectomy. (Excision of the scar, with or without suture.)

MANAGEMENT OF FRESH TRAUMATISMS

In fresh traumatic ruptures of the urethra, Guyon (13) frees the ends of the ruptured urethra and introduces a catheter into the bladder, then the soft parts of the perineum are sutured over the catheter. No attempt is made to approximate the ends. At the end of four days, the catheter is withdrawn. He claims that the defect is repaired by the proliferation of the ends over the catheter.

Dr. Neff's attitude in acute traumatisms is: Shortly after the injury, immediate perineal section is performed. The operation consists in a simple urethrotomy on a grooved staff inserted down to the injured portion of the urethra. If there is extensive urinary infiltration, nothing further is attempted, as the object is merely to secure free drainage, and thus prevent or limit the destructive process. After the hemorrhage is arrested, the wound is left wide open and hot dressings applied. If, however, the operation is done within a few hours after the injury, it is usually possible to find the proximal end of the urethra, if it be cut across, and restore its continuity by approximating the two segments with a few catgut sutures. The wound may then be left open for drainage or may be closed in tiers, by means of buried catgut sutures, approximating the tissues from the urethra to the skin. In the latter case, a small drainage-tube is left in the lower angle of the wound for 48 or 72 hours. Results of this plan of treatment are excellent, and strictures are avoided.

URETHRECTOMY

The history of end-to-end suture of the urethra cannot easily be traced. It seems, however, that one of the first surgeons to make such an attempt was Henry Morris of England (14), who twice sutured ruptured urethras in 1874. The method of urethral approximation was put in practice by König in 1880. In 1884, Symond (15) published a successful case of exsection with end-to-end suture. The method was made popular by Mikulicz, Braun, Socin, and Guyon. At the beginning, the technique of König was to incise the urethra, excise the scar tissue, and unite only the anterior wall by two sutures. Mikulicz, Braun, and others made use afterwards of a circular suture.

OPERATIVE PROCEDURE

A sound is inserted down to the stricture; a median incision is made in perineum (most of strictures and traumatisms involve this portion) down to the sound; urethra is next opened; the proximal end is then looked for, and as soon as found, a grooved director is introduced into the bladder; the stricture is then divided vertically on the grooved director; two transverse incisions are made, one in front and one behind the stricture, and the fibrous tract excised; the proximal and distal segments are then freed, and endeavor made to bring them in apposition. Three to four sutures of fine catgut on round intestinal needle, inserted at equal distances, approximate the segments, the knots being tied either inside or outside. Permanent catheter is left in urethra for seventy-two hours.

There is, as a rule, no difficulty in approximating two ends separated by a distance of less than three centimeters. If the gap is longer, then approximation is difficult, and

the sutures will generally tear. In such cases the mobilization of the urethra must be considered. The possibility of mobilization of the urethra was emphasized by von Hacker and Beck, who made successful transplantations of the urethra in cases of hypospadis. A short scrotal urethra can be transplanted into an artificial groove made in the impermeable penis and glans with perfect assurance of a new patent canal. The experiments of Goldman (16) have proven that after the excision of a considerable segment the ends can be brought together if the urethra is mobilized. Heussner (17) arrived at the same conclusion. In a case of Rupprecht (18) a defect of 8.5 cm., resulting from the excision of a carcinoma of the urethra, was repaired by mobilization of the free ends. It goes without saying that in the repair of such long defects there will be a kinking of the urethra, principally during erection (19).

König was able to repair the defect in a case of removal of cancroid of the entire pars nuda and bulbosa by mobilization and stretching of the ends. It should be borne in mind that the distal portion is more apt for mobilization, the proximal end being, in exchange, more elastic. It must also be remembered that in cases of chronic processes, where the urethra has lost its elasticity, the mobilization and stretching cannot go beyond three or four centimeters.

Attempts have been made to transplant the urethra of animals to men. J. Hogarth Pringle (20) repaired defects of from 5 to 13 cm. by transplanting urethra of ox. "The segment was implanted with success; that is to say, the grafted tissue lived and remained a patent channel." Clennell Fenwick (21) repaired a loss of substance in a man's urethra (length not stated) by transplanting a portion of sheep's urethra. Urethral defects have also been repaired by stolen flaps of mucosa from the vicinity. In 1888, Meusel (22) used preputial mucosa for the repair of excised traumatic strictures. He detached the flap entirely. Reichel (23), later, used the same method, with the exception that he left a pedicle of the flap in place, so as to insure its nutrition. The flap was detached on the tenth day. *Restitutio ad integrum* was obtained in one case.

Wölfler (24) once made use of vaginal mucosa taken in a case of prolapsed uterus.

AFTER-TREATMENT — MANAGEMENT

Some surgeons drain the urethra through the urethral canal only; others add to it perineal drainage; finally, a few combine the urethral with the suprapubic drainage. Among the few advocates of this procedure we quote Henry Rutherford and Badling. In a discussion of the Practitioners' Society of New York, April 13, 1896, Dr. J. D. Bryant regards the suprapubic drainage as an additional danger to the rupture of the urethra.

Rochet, in a communication at the Société de Chirurgie de Lyon, February 9, 1905, states that a permanent post-operative sound is not desirable, because it favors suppuration. If the bladder is overdistended, there is an overflow of urine between the sound and the urethra, which will infect the line of suture. He advises a buttonhole opening made posteriorly to the line of suture, and the introduction, through it, of a catheter for the escape of urine. After the withdrawal of the catheter the opening will close without the formation of a stricture.

DANGERS — PROGNOSIS — RESULT

In fresh traumatisms of the urethra, the dangers are great. Patient may succumb from severe hemorrhage, shock, acute sepsis, or thrombosis. In cases where the urethra is lacerated by a fracture of the pelvis, the mortality is very great. According to Kaufmann, the mortality of ruptures of the urethra without fractures of the pelvis is from fourteen to fifteen per cent, while with fractures it is forty per cent. Operated cases have a greater chance of recovery. Non-operated cases, however, may also recover.

Patients with stricture of the urethra are condemned to chronic invalidism, and sooner or later apply to the surgeon.

After operations on the urethra in acute or even in chronic cases, "urethral fever" is frequently noticeable, notwithstanding the perfect antisepsis and asepsis under which the operation is performed. The question of "urethral fever" has always puzzled surgeons and pathologists. R. Bertelsmann and Mau

TABLE I[1]

WEST SIDE HOSPITAL AND ALEXIAN BROTHERS' HOSPITAL.

(Prof. J. B. Murphy's Clinics)

Date of Operation	Sex	Age	Condition	Operation	Result
Nov., 1891	Male.	27	Urethral stricture.	Resection of stricture with end-to-end approximation of segments.	Cured.
Nov., 1891	Male.	51	Urethral stricture.	Idem.	Cured.
June, 1891	Male.	23	Urethral stricture (marked cystitis).	Idem.	Improved.
Nov., 1892	Male.	25	Vesico-rectal fistula and urethral stricture.	Idem.	Cured.
Aug., 1893	Male.	55	Impermeable stricture in perineal region.	Idem.	Cured.
Aug., 1893	Male.	53	Stricture in perineal portion.	Idem.	Cured.
Aug., 1893	Male.	33	Idem.	Idem.	Cured.
Sept., 1895	Male.	45	Rupture of urethra; contusion of kidney; fracture of pelvis.	Perineal incision; catheter left in bladder; suprapubic incision for relief of infiltration.	Death on fifth day, from shock and sepis.
Oct., 1895	Male.	30	Traumatic rupture of urethra from fall.	Urethrectomy.	Cured.
Sept., 1895	Male.	46	Traumatic stricture.	Idem.	Cured.
June, 1895	Male.	41	Urethral stricture.	Idem.	Cured.
Feb., 1895	Male.	47	Traumatic stricture.	Idem.	Improved.
Sept., 1896	Male.	39	Traumatic stricture.	Idem.	Cured.
June, 1897	Male.	42	Urethral stricture.	Idem.	Cured.
May, 1897	Male.	39	Urethral stricture.	Idem.	Cured.
Oct., 1897	Male.	28	Urethral stricture.	Idem.	Cured.
Oct., 1897	Male.	54	Multiple urethral strictures.	Resection of some of the strictured portion	Unimproved.
Oct., 1897	Male.	36	Stricture in perineal portion of urethra.	Urethrectomy.	Cured.
Aug., 1899	Male.	29	Stricture in perineal region.	Idem.	Cured.
Nov., 1900	Male.	40	Stricture in perineal region.	Idem.	Cured.
Sept., 1900	Male.	67	Urethral stricture.	Idem.	Cured.

[1] This table does not include all cases. Non-traumatic strictures have also been included, because of their similar treatment (urethrectomy).

(25) considered it as being hæmatogenous in origin. Bacteria of a very low vitality may enter the general circulation, become virulent, and then have a pathogenic effect upon the urethra. This is especially true in light types of "urethral fever." C. Mansell Moullin considers it as being due to absorption of toxins produced by the colon bacillus. He says: "The presence of the bacillus can be demonstrated in the vast majority of cases. It is certainly capable of producing toxins of sufficient virulence, even if infinitesimally small." Henry Morris (26), discussing "urinary fever," states that in some cases there is no explanation whatever for a transient urinary fever, and that in some instances patients catheterized under exactly the same circumstances, and suffering from the same condition, one will develop urinary fever and the other will not. While Morris does not deny the possibility of infection, he states that a reflex irritation of the nerve-endings in the mucosa may be a contributing factor in urinary fever.

The prognosis in urethrectomy is usually gratifying. The autopsies of Francke and Heussner show that resection of the urethra with end-to-end approximation gives perfect linear non-retracting scar. Paul Nogues (27) examined eight cases operated by Guyon, and found good results after the end-to-end approximation.

Martens, in fifteen cases of stricture of the urethra treated by excision, found thirteen permanent good results. In Mukilicz's clinic at Breslau, there were, from 1890 to the middle of 1904, 23 traumatic strictures treated by urethrectomy. Of these, 12 were permanently cured, 7 improved, and 4 recurred. Dr.

TABLE II[1]

MERCY HOSPITAL

(Prof. J. B. Murphy's Clinics)

Occupation	Age	Sex	Nature of Injury	Result of Injury	Operation	Final Result
Farmer.	65	Male.	Fall upon perineum.	Stricture.	Excision of stricture with end-to-end suture of urethral segments.	Permanent cure.
Laborer.	31	Male.	Urethral instrumentation.	Annular stricture in prostatic urethra.	Idem.	Permanent cure.
Mechanic.	30	Male.	Gonorrhœa.	Stricture.	Idem.	Permanent cure.
Laborer.	36	Male.	Gonorrhœa.	Stricture.	Idem.	Permanent cure.
Stockman.	36	Male.	Gonorrhœa.	Stricture.	Idem.	Permanent cure.
Merchant.	50	Male.	Periprostatic infection.	Stricture in prostatic region.	Idem.	Improvement.
Laborer.	36	Male.	Fell astride on an iron rail from a glucose-tank, a distance of six feet.	Stricture in perineal region.	Idem.	Permanent cure.
Jeweler.	40	Male.	Gonorrhœa.	Stricture.	Idem.	Permanent cure.
Mechanic.	39	Male.	Traumatism by urethral instrumentation (for old gonorrhœa), resulting in extensive hemorrhage and gangrene.	Gangrene of urethra at the time of admission into the hospital.	Excision of gangrenous portion of urethra, end-to-end approximation of urethral segments; cutaneous loss of substance repaired by scrotal flap.	Permanent cure.
Railroad man.	20	Male.	Fracture of pelvis from street-car collision.	Stricture (when admitted to hospital).	Urethrectomy.	Recovery.
Porter.	37	Male.	Gonorrhœa.	Stricture in membranous portion of urethra.	Urethrectomy.	Permanent cure
Undertaker.	63	Male.	Prostatectomy.	Post-operative stricture and fistula in perineal portion of urethra.	Urethrectomy.	Permanent cure.
Book-keeper.	32	Male.	Urethral instrumentation.	Stricture.	Urethrectomy.	Permanent cure.
Laborer.	48	Male.	Internal urethrotomy (for gonorrhœal stricture).	Secondary stricture.	Urethrectomy.	Permanent cure.

[1] Non-traumatic strictures have also been included in this table, because of their similar treatment (urethrectomy).

Murphy's and Dr. Neff's experience in urethrectomy has been most gratifying.

In closing this article, we most sincerely thank Prof. J. B. Murphy for allowing us to use his clinical material.

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THE CLINICAL SIGNIFICANCE OF CERVICAL RIBS

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THE existence of cervical ribs has been familiar to anatomists for a long period of time, Galen and Vesalius having given detailed descriptions of them. Most of the early writers, in discussing cervical ribs, allude to the Biblical story of the creation of Eve. Riolan states that he had seen a skeleton with thirteen ribs on each side. Bertin, a French anatomist, stated in 1754 that he had examined a skeleton with fifteen ribs on each side; this was interpreted by him as a triply split cervical rib. Coote was the first to remove a cervical rib in 1861, because of pressure symptoms; thirty years later, Fischer removed another. The credit for the most careful anatomic study belongs to Gruber of St. Petersburg (1849).

The surgical importance of the cervical rib is of rather recent date. Even after its anatomic peculiarity had been established, surgeons gave it little consideration. Its surgery may be divided into the pre-Röntgen and post-Röntgen period. In the first period the rib was discovered accidentally in the course of operation for other conditions, and without a previous diagnosis of its presence; in a few exceptional cases the alarming symptoms in the extremity (paralysis and gangrene, for example) prompted the operation. The advance in surgical diagnosis, materially aided by the X-ray pictures, enables the clinician of to-day to diagnose a cervical rib in the pre-aneurysmal, pre-gangrenous and pre-paralytic stage, or, better, as ætiologic factors in neuralgias and ischæmias of the arm.

EMBRYOLOGY AND ANATOMY

In embryos of lower vertebrates, every vertebra has a rib attached to it. The first seven cervical ribs, however, remain rudimentary in man, so that he has only twelve ribs, extending from the first dorsal (costal) to the twelfth dorsal, inclusive. We very seldom find a rib attached to the first lumbar, thus adding a thirteenth rib to the twelve pairs of ribs. I have had, in my experience, a case in which there were severe pains below the twelfth left rib. At first, the diagnosis of intercostal neuralgia was made; later, however, as the symptoms did not subside, more careful examination revealed the thirteenth rib, and upon its removal the symptoms disappeared. A cervical rib develops on the transverse process of the sixth or seventh cervical vertebræ, and from a separate center of ossification, articulating with the body and transverse processes of the cervical vertebræ in the same manner as the thoracic ribs. The development of the rudimentary ribs is, as Planet remarks, an evidence of atavism, as all vertebrates originally had as many ribs as vertebræ. Most of the cervical ribs have all of the elements of a thoracic rib. If the rib is long enough, then the intercostal space between the cervical rib and the first thoracic rib is occupied by intercostal muscles, nerve, artery, and vein, exactly as in the thoracic intercostal spaces.

As to the relation of the rib to the subclavian artery, Halbertsma[1] states: "If the cervical rib is 5.6 cm. or more in length, the subclavian artery passes over it; if only 5.1 cm. or less, the artery passes over the first dorsal rib." The subclavian artery presents very often, at the epoint wher it crosses the cervical rib, a flattening or aneurysmal dilatation. This is due, as I have shown in my first article on this subject,[2] to the pressure of the artery against the rigid scalenus anticus muscle. (Fig. 1.) Since the publication of this article, the explanation has been accepted by several writers. W. Wayne Babcock[3] ascribes the aneurysm of the subclavian to a "circulatory deficiency, not

[1] *Arch. f. d. Holländ Beitr. zur Nat. u. Heilk.*, 1858, i.
[2] *Annals of Surgery*, March, 1905.
[3] *American Medicine*, Oct. 7, 1905.

from compression, but from the retardation of current, due to the angulation or tortuosity of the vessel."

Cervical rib presents many abnormalities. In the case of Stiffler the rib originated from the sixth vertebra. Bertin states that the posterior end of the rib articulates with both transverse process and body of the seventh cervical, or with the transverse process only, and again with the transverse process of the sixth. Rosenmüller found in an embryo, six months old, a double cervical rib articulated posteriorly with the vertebral body between the sixth and seventh cervical vertebra. "A peculiar round movable bone was present between the sixth and seventh vertebra of same case." In a cadaver examined by J. Fischer, with a double cervical rib, the posterior end articulated between the sixth and seventh vertebræ and also with the tubercle of the transverse process of the seventh. Two cervical ribs on the same side are a very rare occurrence, and have been noted in only two instances.[4]

Cervical rib is frequently associated with other congenital malformations. In a case of Royal Whitman, presented at the New York Surgical Society, March 8, 1905, aside from a double cervical rib the patient presented extreme torticollis, spinal curvature, and meningocele of the back of the head.

According to Carl Beck of New York, bilateral cervical rib is found in 67 per cent of the cases, while it is unilateral in only 33 per cent.

It has been said that cervical rib is more commonly found on the right side, and some writers are inclined to see a direct relationship between the occurrence on the right side and the more active use of the right arm. In the analysis of Riesman[5] of 41 cases in which the side was specified, the cervical rib was found 26 times on the left side and 15 times on the right side. This, we believe, truly represents the anatomic condition, but as the right arm is most used and put to greater excursion of motion, it has produced symptoms more frequently than the left. Skiagram in case 2 shows rib present on both sides, but left developed to lesser degree.

[4] 1. STRUTHERS: *Journal of Anatomy*, 1871. 2. KARGER: *Beitr. zur klin. Chir.*, vol. xiv.

[5] *Univ. of Penn. Med. Bull.*, March 1, 1904, No. 1.

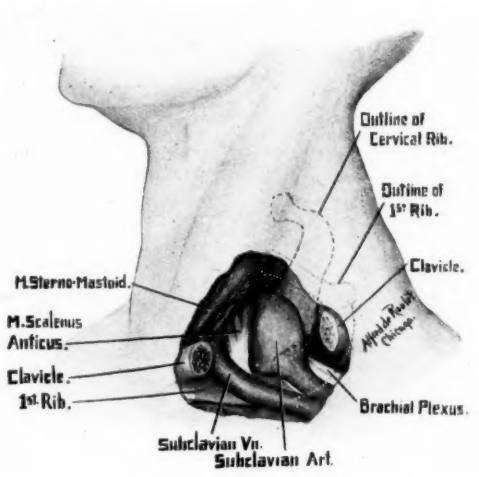

Fig. 1. Subclavian vein separated from the subclavian artery by scalenus anticus muscle. Aneurysmal dilatation of subclavian.

CLASSIFICATION

Gruber's classification has been generally accepted, and answers all practical purposes. It includes four types of ribs, divided as follows:

1. A process-like projection scarcely extending beyond the transverse process.

2. A short rib extending an inch beyond the transverse process, the end of which is either free or attached to the first rib.

3. A thin quarter-rib extending to the external border of the scalenus anticus muscle, having either a free end or attached to the first rib.

4. A complete rib extending from the spinal column to the sternum, with which it is connected by a sternocostal cartilage, either individual or in combination with the first rib.

The first three classes are called by Gruber, "incomplete," while the fourth one is "complete." The latter type is very rare. A complete cervical rib is described in the monograph of Pilling.[6]

ÆTIOLOGY — HEREDITY

It seems that heredity plays some rôle. Israel, for example, stated, in a discussion on Borchardt's paper at the meeting of the Berliner

[6] *Ueber die Halsrippen des Menschen.* Inaug. dis. Rostock, 1804.

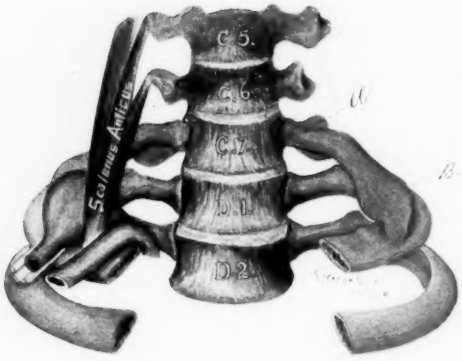

Fig. 2. Showing subclavian artery dilated as a result of pressure against the scalenus anticus muscle.

Medizinische Gesellschaft, November 6, 1901, that he had operated on a patient with bilateral cervical rib, whose sister also had bilateral cervical rib with symptoms. Heinrich Rosenhaupt[7] makes the statement that cervical ribs are found in the progeny of parents with some physical degeneracy. The exciting factor of this condition cannot be definitely stated. In some cases the direct pressure on the neck and shoulders seems to bear some relationship. This is supported by the occurrence of cervical ribs in soldiers on the side on which they wear the strap.

The age at which cervical ribs become conspicuous is that of puberty. In most of the cases the symptoms have become noticeable between the age of 12 and 18. Surgical ribs are more commonly found in women than in men, for reasons that are not well known. Of the 44 cases analyzed by Riesman,[8] 39 were in females and 5 in males.

SYMPTOMS

As the majority of cervical ribs were seen in post-mortems, it can be assumed that most of them do not give symptoms during life. In a group of cases reported, the symptoms were so obscure and complex, and so closely resembled some spinal diseases, that a diagnosis intra vitam was very difficult, and many errors resulted. In the pre-Röntgen period, most of the ribs were discovered accidentally. With the facilities of the X-ray, and also with the better clinical knowledge of the symptomatology of this condition, we are to-day able to make an early diagnosis. The symptoms can be classified in two principal groups: (*a*) Vascular; (*b*) Nervous.

(*a*) The changes involve the arterial and not the venous element. As I have emphasized in my previous article, there is no venous stasis, notwithstanding the great ischæmia from arterial pressure. This is explained by the anatomic position of the vein, being situated anterior to the scalenus anticus muscle, giving it ample room for displacement. (Figs. 2 and 3.) Even in the presence of an aneurysm of the subclavian artery, the vein cannot be compressed, because it is protected by the intervening scalenus muscle. This could perhaps happen if the scalenus muscle were destroyed by the aneurysm, and even then the possibility of compression is doubtful. We therefore repeat that the principal injury is done to the artery, and not to the vein.

In some cases the radial pulse on the side of the rib could not be felt. This was due either to simple compression or to obliteration of a subclavian artery. Borchardt and Karg[9] found that the diminution of the radial pulse

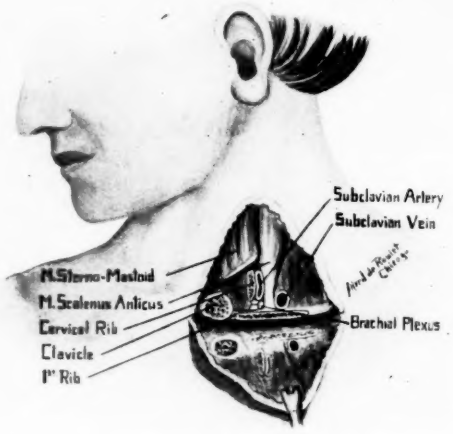

Fig 3. Topographical relations of vessels and nerves to the scalenus anticus muscle and cervical rib.

[7] *Arch. f. Kinderheilk*, 1905, xlv, 205–225
[8] Loc. cit.
[9] *Berl. klin. Wochenschr.*, No. 5, 1901, p. 1265.

with each inspiration is a fairly constant symptom, the explanation given by Karg being that the subclavian presses on the ribs with each inspiration. The removal of a cervical rib, as a rule, restores the radial pulse. This, however, was not true in some of the reported cases.

Most of the patients have a pale hand, resembling the preperiodic pallor of Raynaud's disease or ischæmia of intermittent claudication. They complain of cold feeling in the extremity, which becomes more accentuated if put in cold water or exposed to cold air. In my first case the arterial pressure was relieved by the elevation of shoulders. An aneurysm of the subclavian artery was present in the cases of Poland, Adams, Braun, and in my first case. A trauma is often the exciting factor of the aneurysm. When present, a bruit can be heard over the ribs, and rhythmic expansions are distinctly noticeable. In long-standing cases a gradual endarteritis obliterans takes place, which may lead to thrombosis. Cases ending in gangrene of the fingers are, unfortunately, known, as reported by Gordon [10] and W. Wayne Babcock.[11]

The main nervous symptoms are tingling of the hands and fingers, sensory disturbances of various degrees, and also motor derangements. At first there may be a hyperæsthesia or a paræsthesia; later, however, there is a diminution of sensation, and finally, anæsthesia. Patients have severe pains, especially when assuming certain positions. The character of the pain is similar to that of neuralgia or neuritis, which fact has led to frequent errors in diagnosis. In some cases there is marked ataxia of the limbs, the same as is seen in diphtheritic paralysis and Djerine's "névro tabes péripherique." The muscular tonus of the entire limb is considerably diminished, and some patients commence to use the left hand if the right happens to be affected. In case of bilateral cervical rib, complete inability to work is not uncommon.

Thorburn [12] found in one of his cases paresis of the muscles on the radial side of the hand, and spasm of muscles on the ulnar side. Occasionally the long flexors of the fingers were involved. The symptomatology was often very similar to that of lesion of the first dorsal branch of the brachial plexus.

In isolated cases there has been an intermission of symptoms for a long period of time, with the case continually under the observation of physicians. Suddenly the symptoms become pronounced without any apparent cause; sometimes, however, it is the result of trauma.

The disappearance of fat in wasting diseases makes it possible for the formerly harmless rib to press upon the artery or nerves; the retraction of the apex of the lung in pulmonary tuberculosis may also be an exciting factor.

Another fairly constant factor in unilateral cervical rib is scoliosis, noted and emphasized by Garré. Cervical rib is present in about two per cent of all scolioses. The explanation for the occurrence of this scoliosis is not always the same. In Germany, where the subject has been studied most carefully, there are two factions — that of Garré and that of Hoffa. The former considers that the scholiosis is due to the fact that the cervical portion of the spinal column does not move freely on the side of the rib; furthermore, that there is an asymmetry of the musculature of the neck. There is a change in the point of insertion of the scalenus muscles. The scalenus anticus muscle often takes insertion on the anterior end of the cervical rib; the scalenus medius partly on the cervical rib and partly on the first thoracic rib. Garré does not believe that the scoliosis is congenital. The cause is congenital — that is, the cervical rib — but the curvature develops at puberty. Hoffa calls this type of scoliosis "neurogenous form," and Helbing, who studied four hundred cases from Hoffa's clinic, describes it as "reflex scoliosis," similar in origin to "scoliosis ischiadica." The constant pressure upon the brachial plexus is, according to Hoffa, responsible for the motor paresis and the gradual muscular atrophy. The scoliosis is produced by the over-action of the muscles on the non-affected side. It is, in other words, a "static scoliosis," similar to that of infantile paralysis.

The scoliosis of cervical rib is characteristic, and Helbing gives the following diagnostic characters:

1. The high location and the fixed variety.

[10] *Brit. Med. Jour.*, June 8, 1901.
[11] *American Medicine*, Oct. 7, 1905.
[12] Royal Med. and Chir. Soc., 1904, No. 8.

2. The torticollis-like position of the head and neck. To support his view, Helbing cites cases in which "reflex scoliosis" disappeared under the anæsthetic, which he considers an evidence that the position taken by the patient was intended to avoid pressure upon the brachial plexus. Hoarseness was recorded in the cases of Bardeleben, Planet, and Borchardt. The first two writers attributed it to the compression of the recurrent laryngeal nerve, but Borchardt, in his operation, found no evidence of pressure. Furthermore, successful removal of the rib did not restore the natural voice of the patient, so Borchardt concluded that the hoarseness was a bulbar symptom. The deduction, however, is not a sufficient basis for excluding pressure as a cause, as long as continued compression may have permanently destroyed the conductivity of the axones.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

Neither is a simple matter. In some cases, cervical rib is discovered accidentally; during the percussion of the lungs, for example, or examination of the side of the neck for other pathologic conditions. Palpation may sometimes be sufficient to establish a diagnosis, particularly if the rib has attained considerable size. The elevated and pulsating subclavian artery is the most striking deviation from the normal anatomic relations in the supraclavicular space. Slight pressure on this stops the radial pulsation. An X-ray picture is a valuable aid.[13] Still, as emphasized by Hugo Levi, X-ray pictures may sometimes be misleading, because the lateral process of the seventh cervical vertebra may be very conspicuous in them, misleading one to diagnosis of cervical ribs, as happened in Berlin to two leading X-ray experts. The difficulty arises when the clinical picture assumes the aspect of primary peripheral nerve lesions or diseases of the spinal cord, or when there is associated with this condition a possibility of spinal disease, as has been pointed out by Oppenheim. Cervical rib may be associated with syringomyelia or sclerosis multiplex. It is a well-established fact that in congenital diseases of the spinal cord there are often anomalies of the skeleton.

Fig. 4. Skiagram of case 1.

The prognosis in symptogenetic cases without operation is very unfavorable, if the rib is of the second or third variety of Gruber. In some cases, massage and electricity may restore the sensory and motor functions. Some patients relieve themselves temporarily by a self-education, experience teaching them the most favorable position in which to hold the shoulder and arm. As far as the prognosis of operative procedure is concerned, it is uniformly favorable.

TREATMENT

Cutaneous incision is practically of no importance, and may vary according to the taste of the operator. As a rule, there is no difficulty in identifying the rib, nor in removing it. This can be accomplished either by a subperiosteal removal or by an extirpation *en masse*, as was done in my second case. Israel recommends the subperiosteal method on account of the fear of injuring the pleura. The preservation of the periosteum, says Israel, will not develop a new rib in adults. During the operation the pleura may be injured, as happened in two cases.[14]

Recurrence is very rare, though Beck observed one after a subperiosteal removal. The rib was extirpated in a second operation, and has not recurred since.

[13] *Neurolog. Zentralblatt*, 1904, xxiii, p. 902.

[14] 1. TILMANN: *Deutsche Zeitschr. f. Chir.*, vol. xli, p. 330. 2. PLANET: *Thèse de Paris*, 1890, "Tumeurs Osseuses du Cou."

CASE 1. Mr. J. T. G., aged 38, farmer. Admitted to Mercy Hospital October 4, 1904. Operated November 9, 1904.

One and a half years ago, patient first noticed tingling sensation in the last phalanx of the left index finger. Numbness and tingling became more pronounced when the hand was placed in cold water, and disappeared when placed in hot water. This condition existed for six months in the index finger only, after which time the distal phalanx of the little finger became involved. The symptoms continued throughout the winter and disappeared in the summer. In September, 1904, all of the fingers of the left hand were affected; in addition, there were severe pains in the palm and thumb and on the anterior aspect of the wrist on the radial side. A few weeks preceding the operation the pain was so intense that the patient was unable to sleep; morphine gave no relief.

On examination, the hand was found to be cold, and muscular power considerably diminished. Occasionally there was radiation of pain to the elbow. The hand and forearm became ischæmic when exposed to cold. For some time the patient was treated for rheumatism and neuralgia, without effect.

Digital examination revealed the cervical rib, over which there was an abnormal dilatation and pulsation of the subclavian artery. By pressing the shoulder down, the radial pulse diminished. The rib was extirpated by fragmentation, including the periosteum, and patient made an uneventful recovery. There has been no recurrence of symptoms or of the cervical rib.

CASE 2. Miss C. F., aged 26, dressmaker. Admitted to Mercy Hospital June 10, 1906. Discharged June 27, 1906.

The patient had enlargement of the thyroid, of thirteen years' standing. On examination I found a considerable enlargement of the right lobe. She complained of dyspnœa; also of a tired feeling of the right arm. She stated that if a hand were placed on her shoulder, accidentally or otherwise, it caused a "stinging pain" which radiated down the arm to the back of the hand and the fingers. Occasionally this would also cause pain in the axilla. The same symptoms could be produced by palpating or pressing over the supraclavicular region, where a hard bony mass was evident just posterior to the sternomastoid muscle. Slight pressure stopped the radial pulsation. Depression of the shoulder in this case compressed the brachial plexus and also the subclavian artery.

A clinical diagnosis of hyperplasia of the right lobe of the thyroid to a pathologic degree, and also a cervical rib, was made, the latter fully confirmed by an X-ray picture, showing the rib very distinctly. The right lobe of the thyroid was removed. In a second operation the cervical rib was extirpated from the right side. The rib was of medium length, and the subclavian artery was held one inch above normal position and was flattened out on the surface of the rib. The rib, instead of being extirpated in fragments just behind the scalenus anticus by rongeur, was divided from its attachment to the cervical vertebra and pulled forward and torn from its attachment to the first rib and removed in one piece. After the removal of the rib, both subjective and objective symptoms disappeared. Patient has a smaller cervical rib on the other side, which, however, does not produce symptoms of pressure. Undisturbed recovery.

OPERATIVE TECHNIQUE

The most convenient incision is one parallel and just anterior to the roots of the brachial plexus, beginning three inches above the clavicle and extending downward to it. The platysma is divided and the roots of the brachial plexus exposed by blunt dissection, just behind the scalenus anticus. The subclavian artery then presents itself on the upper surface of the rib. It can be freed by blunt dissection and elevated gently without traumatizing it, and can be held and sustained in this position by blunt retractors. The rib is then freed by displacing the roots of the brachial plexus backwards and without disturbing the periosteum. This process is continued until the articulation of the rib to the spine is reached. It is then divided at its spinal attachment with bone-cutting forceps. It is then grasped with sequestrum-forceps and gently lifted upward and outward and torn from its attachment to the first rib, to which it is bound by fibro-cartilaginous union. The blunt retractor protects the artery as the rib is lifted upward and

Fig. 5. Skiagram of case 2.

torn free. This is easier and more satisfactory than removal in fragments by rongeur. It leaves a smooth surface on the first rib, onto which the artery drops. Unless the aneurysmal dilatation is great, it should not receive special attention. The wound is then closed by a set of deep muscular sutures, including the platysma and deep fascia. The superficial portion is closed by horsehair.

The free exposure of the rib before division is the most essential factor in rendering the operation safe and easy. Care must be exercised not to compress the roots of the brachial plexus with a sharp retractor, or continue the compression on them for a long time. This will produce a traumatic neuritis.

We feel that it is essential to remove the periosteum. It adds nothing to the difficulty or danger of the operation, and gives greater assurance from recurrence of pressure from an osteoma, if not a new rib.

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CONGENITAL HYPERTROPHIC PYLORIC STENOSIS OF INFANTS

With Report of an Operated Case

By GEORGE F. THOMPSON, M. D., Chicago

DURING the past few years the number of cases of so-called congenital hypertrophic stenosis of the pylorus in infants appearing in the literature has been constantly increasing, due, no doubt, to the more accurate diagnosis of infantile stomach disorders of this nature, stimulated by the early reports of Hirschsprung (1888), Pedden (1892), Pill (1892), and the early operative measures pursued by Stern (1897), Meltzer and Löbker (1898). Although three cases had been reported previously to this time (Beardsley, 1788; Williamson, 1841; Dawosky, 1843), no general interest had been aroused in the matter. The number of cases reported up to June, 1906, has been 157, including the author's case, and also one by Fisk (*Ann. Surg.*, July, 1906), and there are frequent references in the literature to cases having been observed but not yet published.

The case here reported occurred in 1904, and was, so far as I have been able to ascertain, the first case to be diagnosed or operated in Chicago. Since it was shown at the Chicago Medical Society in May, 1905, at the time Scudder of Boston presented his paper on this subject, three further cases have been observed and operated here, but not published (Capps' case operated by Bevan, and two cases of F. X. Walls operated by Van Hook).

REPORT OF CASE

M. M., male, born April 15, 1904.

Family History. Negative. Mother had given birth to one child two years previously, which is perfectly healthy.

The labor was normal, of seven hours' duration, and the puerperium uneventful. Weight at birth was 10 pounds 4 ounces. Meconium was passed each day, one or more times, until the third day, when the passage was yellowish brown. After the initial loss of weight the child soon regained the loss, and on the twenty-second day weighed 10 pounds 6 ounces. During this time he nursed naturally, and the only unusual feature noticed was the presence of constipation, which was not absolute, but a good bowel movement was never obtained, and enemata, as well as cathartics, were freely used. The passages contained fæcal matter, and, at times, undigested particles and mucus.

Twenty-second day. Weight 10 pounds 6 ounces. Cried a great deal. Vomited slightly for the first time.

Twenty-third day. Temperature normal. Vomited copiously at 2 P. M. Weight 10 pounds 4 ounces.

Twenty-fourth day. Vomited some after each feeding. Weight 10 pounds 2 ounces.

Twenty-fifth day. Vomiting continues. Weight 10 pounds.

Twenty-sixth day. Vomiting continues. Cried much; had colic; greenish bowel movements. Weight 9 pounds 14 ounces.

Twenty-seventh day. No vomiting. Weight 9 pounds 4 ounces.

Twenty-eighth day. Vomited large amounts. Weight 9 pounds 2 ounces.

Thirtieth to thirty-sixth days. Vomited frequently — sometimes soon after food, and then would retain several feedings and vomit copiously. Bowel movement slight, dark yellow or green, and offensive. Temperature occasionally 100°–101°, P. M.

Thirty-seventh day. Weight 8 pounds 1 ounce. Still vomits. Temperature 102°.

Thirty-eighth day. Some blood noticed in vomitus.

Forty-second day. Some blood noticed in vomitus.

Forty-third day. Weight 7 pounds 10 ounces. Nutrient enemata ordered.

Forty-fifth day. Vomited less. Inguinal hernia developed.

Forty-sixth day. Slept well for six hours. No vomiting. Nursed well. Nutrient enemata still used. Gained 5 ounces. Weight now 7 pounds 15 ounces.

Forty-seventh to forty-ninth days. Vomited considerably; weight 7 pounds 12 ounces.

Fiftieth day. First seen by author. Temperature 100°. Weight 7 pounds 8½ ounces. Abdomen distended; lower curvature stomach at umbilicus; snapping the finger on the abdominal wall caused marked peristaltic waves to travel across the stomach, and then reverse peristaltic waves traveled back from left to right, and forcible, expulsive vomiting followed. A tube was then introduced into the stomach and eight ounces of water easily accommodated without vomiting.

Fifty-first day. Cried all night. Vomited fre-

This shows the specimen as removed at autopsy. In the pyloric region is seen the tumor-like increase in the size of the pyloric ring. The stomach is considerably dilated. Below may be seen the section of jejunum used for the gastro-enterostomy still attached by suture to the stomach.

quently. Weight 6 pounds 8 ounces. Temperature 100° at 9 A. M. Operation at 11 A. M. by Drs. F. S Hartmann and J. B. Murphy. Chloroform narcosis.

Pyloric tumor easily discovered after incision of abdomen. Anterior gastro-enterostomy (suture) performed. Condition after operation, poor. Saline infusions given. Slight hemorrhage from abdominal wall checked after removal of one suture. Temperature 103° to 106° at time of death — 11 P. M. — 12 hours after operation began.

I have omitted all details in reference to treatment from the record, in order to simplify it. Several consultations had been held and various forms of treatment tried. Barley-water, whey, etc., were used at first. Examination of the breast milk showed it to be normal; so nursing was resumed. Then a wet-nurse was obtained, and later nursing was supplemented by rectal feeding, during which period the child gained a few ounces the first few days, but rapidly declined again.

The above report shows that the symptoms were those characteristic of the disease, and only differed in a few points from the general run of these cases. It will be noted that blood was noted in the vomitus on the thirty-eighth and forty-second days; also that there was a slight gain of weight for a time; and finally, that reverse peristalsis was observed. I have found only one record of blood being vomited (Schmidt), and only one record of reverse peristalsis having been observed (Marx).

I have also omitted a detailed description of the pathologic findings, as these consisted essentially in the increase in size of the circular layer at the pylorus and in the adjacent wall of the stomach, as often described heretofore in these specimens.

NOMENCLATURE

Various terms have been used to designate the disease under consideration. "Congenital hypertrophic stenosis of the pylorus in infants" is the common designation, and perhaps, though cumbersome, the most appropriate and satisfactory. Although the question as to its congenital nature is still a matter of dispute, it would seem best to continue the use of the word "congenital" until the error of this has been proven and also to differentiate it from a similar condition found at later periods in life, which some believe to be the result of pyloric spasm, though many believe these so-called congenital cases are also due to spasm. Whether or not the pathologic change in the circular muscle is pure hypertrophy or hyperplasia, or both, is not definitely agreed upon, but one word or the other must necessarily be used to avoid confusion with other forms of congenital stenoses and atresias of the pylorus. It is also well to add "in infants," because many cases are on record of hypertrophic stenosis occurring, or first manifesting itself, in adults, and these are probably also of congenital origin (Landerer, Maier, Maylard).

In considering pyloric stenosis in infants in general, several entirely different conditions or pathologic entities are probably met with.

1. Atresias and stenoses due to (*a*) errors in development, consisting in a complete or partial occlusion of the pyloric orifice without thickening of the bowel-wall, and (*b*) bands and adhesions following fœtal peritonitis.

2. Spasm of the pyloric sphincter, without hypertrophy, or, at least, not sufficient hypertrophy to cause obstruction.

3. Pure cases of hypertrophy of the circular muscle, which constitutes the greater number of reported cases.

4. Mixed cases, in which both spasm and

hypertrophy play a part, as is perhaps illustrated by several cases in which there was hypertrophy of the pylorus present, but the lumen was not sufficiently narrow to account for the marked obstructive symptoms (e. g., McCaw and Campbell's case).

SYMPTOMATOLOGY

The reported cases have varied considerably in the time of onset, rapidity of development, and severity of the symptoms, so that various clinical classifications could easily be construed.

In general, the cases may be divided into acute, subacute and chronic, and delayed cases, depending upon the completeness of the obstruction and the time of its manifestation.

The acute cases generally show symptoms in a few days or weeks, and run a rapidly fatal course if not treated, while the subacute and chronic cases include the milder types, which (1) begin early, but in which the obstruction is only partial; and (2) those which do not manifest themselves for weeks or months, and are also due to partial occlusion. The delayed cases are those in which the disease manifests itself clearly for the first time in childhood, adolescence, or adult life, though there may have been gastric disturbances present from birth (Beardsley, Hansy, Shaw, and probably, also, some of Landerer's and Maier's cases).

An acute case may improve under treatment and become one of the subacute type, or the subacute or chronic forms may at any time suddenly develop acute symptoms and a fatal termination result.

The characteristic symptoms, in the order of their importance and frequency, are: Vomiting, constipation, loss of weight, epigastric distention, visible peristalsis, dilated stomach, and palpable tumor.

VOMITING

This is the most constant and important symptom. Obstinate and continuous vomiting in infants is almost invariably due to congenital obstruction of some kind. It may begin on the first day or be delayed for weeks, and then even cease for months, to begin again later — even after years (Beardsley, Shaw, etc.). The average time of onset of vomiting is about seventeen days. It is in most cases characteristic; i. e., it is of the so-called "mechanical" or "obstructive" variety — explosive, forcible, and without apparent nausea. Many exceptions to this have been noted, however, both in the entire absence of such suggestive vomiting (e. g., Caultey, Rogers) and in the fact that the expulsive character may be apparent at one time and not at another in the same patient. The character of the food, or the quantity, does not alter in any material way the nature of the act, though they may influence its frequency. The relation of the time of vomiting to the ingestion of food is also variable, but important. In some cases food is vomited as soon as taken; in others, not for some time, or the time may vary in the same patient. Sooner or later, however, in most cases the vomiting is delayed until several feedings have been retained, and then suddenly the whole is forcibly ejected — six to eight ounces at one time. This is dependent upon the gastric dilatation which develops in cases not too rapidly fatal, in which the obstruction is of moderate degree. The character of the material vomited is quite constant — generally undigested or partially digested milk with few curds. Bile has been observed in only two cases, as has also blood in two cases (Schmidt, the author). Hydrochloric acid is generally present. Free hydrochloric acid has been found in three cases by Freund, but hyperchlorhydria has also been found to exist in infants with otherwise normal stomachs.

CONSTIPATION

Next to vomiting, this is the earliest symptom, in fact, it is usually present before vomiting begins. The author's case was said never to have had a good bowel movement, and this fact was commented upon before other evidences of trouble were manifest. Meconium is passed normally during the first few days, and after that the amount and character of the stools depend upon the degree of obstruction present. If complete, there is absence of fæces in the passage. In most cases, however, the stools contain fæces and often undigested curds, and in some the movements were natural up to the onset of vomiting (Morse and Murphy, Robertson), showing

that the occlusion was only partial. Movements can often be obtained only by enema, and are scant. Later there may be considerable mucus, and in many cases greenish movements, while in several cases diarrhœa has been noted at intervals (e. g., Hirschsprung, Nicoll, and Wachenheim among the operated cases, and Griffith and Neild among those treated medically). In one case a breastpin swallowed before the onset of the vomiting was passed later (Morse and Murphy).

LOSS OF WEIGHT

This is, in general, constant and progressive. Its onset and rapidity vary naturally with the degree of obstruction. Even in the severe cases, some of the weight normally lost during the first few days may be regained, only to be lost again in the next few days. Again, an apparent increase of a few ounces may be due to the retention of several feedings. In some cases, under dietetic treatment, lavage, rectal feeding, etc., several ounces may be regained, as in the present report, on the forty-sixth to the forty-ninth days. The presence of this gain of weight has been detrimental to the welfare of the child, as in one case at least (Cautley), it misled the physician and caused a fatal error in diagnosis by the man who has seen more cases than any other one observer. With the loss of weight an appearance of *marasmus* and *cachexia* gradually results, and no doubt many fatal cases diagnosed as marasmus in former days have been cases of pyloric stenosis. In the presence of these symptoms of disorder of the alimentary tract the child lacks the accompanying symptoms of "indigestion." The tongue is clean, the breath natural, and the child is hungry — ravenously so — except for a while after each feeding. There is no evidence of nausea and not much distress, unless the stomach is too full, and this is soon relieved by the vomiting, only to be followed by the cry of inordinate hunger.

EPIGASTRIC DISTENTION

Naturally, after several feedings have been retained, the upper abdomen is distended, and this is often noticeable to the nurse. There is nothing characteristic about this — it is only suggestive.

PERISTALSIS

Peristalsis has been visible in about one third of the cases. It occurs, perhaps, only after some hypertrophy of the gastric wall is present, and therefore, as a rule, late in the course of the disease, when it can also be more readily detected through the thinned abdominal wall. Reverse peristalsis is mentioned in only one case (Marx), which recovered without operation, so that the diagnosis was not positive. In the author's case, however, it was clearly visible, and was followed by forcible vomiting.

DILATATION OF THE STOMACH

This was not accurately determined in many of the older cases. In the newer reports it is generally mentioned as present, but in some cases the stomach is normal or even contracted. Early operation invalidates the development of hypertrophy (e. g., Townsend and Scudder). In the author's case eight ounces were introduced by tube and recovered.

TUMOR

Nicoll states that he palpated a tumor in 20 per cent of his cases. Scudder says a tumor was palpable in 18 per cent of 115 cases. In the earlier cases it is probable that the tumor — not being suspected — was often not discovered on that account. In the cases reported since January, 1905, the tumor has been palpated in 7 of 14 cases (50 per cent) — whether under anæsthesia or not is not often stated. It lies in the location of the normal pylorus, only slightly higher and more deeply covered by the liver, on account of the anatomical relations of the stomach in infants, and is therefore more difficult to palpate than would be expected. At the same time it must be remembered that other things can simulate a tumor; e. g., an enlarged gland, or dense adhesions in the pyloric region due to fœtal peritonitis (Mya: *Monatsch. f. Kinderh.*, 1905, iv, 341).

DIAGNOSIS

Once suspected, the diagnosis is generally easy, as may be judged from the character of the symptoms, as above enumerated. The conditions to be considered in the differential

diagnosis are: 1. Other forms of congenital intestinal obstruction; 2. Spasm of the pylorus; 3. " Indigestion."

1. In these cases the diagnosis may be impossible, but this is not material, as the treatment is similar in both. Bile is usually present in the vomitus of cases other than pyloric hypertrophy, but it has even been noted in two of these, and the symptoms are earlier in their onset, more severe as a rule, and their course more rapidly fatal.

2. From pure spasm without hypertrophy the differentiation will always be difficult. Vomiting, constipation, loss of weight, and even peristalsis, might be present in both. A palpable tumor would settle the diagnosis, but it must be remembered that some claim (and with good reason) that spasm and hypertrophy may go hand in hand, and cases are reported as having been cured without operation in which a tumor was palpable (Neild, Ibrahim). If a tumor is palpable, the question to be decided is, whether or not to operate, and when; but this will be referred to later. The presence of free hydrochloric acid would lend color, perhaps, to the existence of spasm. Absence of, or only intermittent, constipation, improvement under dietetic and medical treatment, and a substantial and sustained gain in weight would also favor the diagnosis of spasm.

3. From " indigestion " the failure of proper treatment and the appearance, sooner or later, of the characteristic symptoms and signs, should render an early diagnosis easy in most cases. It should be remembered that continuous, persistent vomiting in infants, in spite of treatment, is almost invariably due to some form of occlusion.

PATHOLOGICAL ANATOMY AND HISTOLOGY

The gross change in the stomach is very constant. The region of the pylorus is occupied by a dense, tumor-like, almost cartilaginous, mass, which encircles the whole circumference of the pylorus, is homogenous in its consistency, and ends abruptly at the beginning of the duodenum, while the proximal end, though distinctly demarked, shades more gradually into the gastric wall, especially when hypertrophy of this viscus has developed.

The tumor-like mass averages about 2½ to 3½ cm. in length and about 20 mm. in diameter, is movable with the pyloric end, and free from adhesions or other evidences of inflammatory processes. Dilatation of the ventriculus is present in many cases, and hypertrophy of its walls demonstrable to the eye and touch, especially toward the pyloric end. The intestine below the obstruction is generally empty, collapsed, and of lessened diameter. On section of the stomach and pylorus, the projection of the tumor into the lumen of the pylorus is evident, and, macroscopically, the cut section resembles normal bowel-wall. On the duodenal side the sharp limitation of the tumor covered by the projecting folds of mucosa makes it resemble the cervix uteri. The gastric mucosa in the vicinity of the pylorus is redundant and thrown into numerous folds — most marked longitudinally, while little evidence of gastric catarrh is visible. The size of the pyloric orifice varies considerably. In some cases — as in this one — a fine probe 1 mm. in diameter could not be introduced. In others, the lumen has a diameter of 3 to 7 or 8 mm. The failure to pass a small probe is probably due to the reduplications of the mucosa, more than to the impassability of the stricture. The obstruction has sometimes been so marked as to render the orifice impermeable, even to fluids. How much of this diminution of lumen is due to post-mortem rigidity is of course problematical, but that this whole phenomenon is simply a post-mortem condition, as has been held by some, sounds highly improbable. The absence or presence of only small amounts of fæcal matter in the bowel proves that the occlusion — in acute cases — must have been of a high degree.

Microscopically, the principal change consists in a relatively extreme increase in the thickness of the circular muscle layer at the pylorus, both hypertrophy and hyperplasia being said to be present.

In rare cases the longitudinal muscle layer is also thickened, as is frequently, also, the mucosa, and in some reports the muscularis mucosæ. The submucous layer has been seen to contain lymphoid tissue, and new connective tissue has been demonstrated a few times. The glands of the pyloric end appear quite normal.

If this is a congenital condition, a striking feature is the uniform absence of other congenital anomalies in these cases — two cases of inguinal hernia (Rogers, the author) being the only reported deformity, and this is not as great a proportion as in normal infants.

ÆTIOLOGY

The ætiology of this interesting disease is not settled, and, owing to the difficulty of obtaining definite early observations, may not be for some time. Briefly, the various theories held as to causation are:

1. That it is a congenital anomaly, due to an error of development; by some considered an overgrowth (Nicoll, Torkel), and by others as an example of reversion; i. e., atavism (Lynch).

2. That the hypertrophy is the result of spasm, and this spasm is due to —

(*a*) In co-ordinated action of the muscles dependent on functional disturbances (Thomson, Still);

(*b*) Gastric irritation (Pflaunder);

(*c*) Hyperchlorhydria (Freund).

It seems almost impossible that such a marked hypertrophy of the circular muscle could be produced in so short a time after birth, it having been present in many cases operated at three or four weeks, and in one case at fourteen days (Scudder), and also in cases which went to autopsy early. It is true, however, that no case of this kind has been observed in the fœtus up to the present. The grounds on which the spastic theory is based are empirical only, unless the observation of Freund, who found free hydrochloric acid in three of his cases, can be considered as tangible evidence which would favor the role of spasm in the ætiology.

It has occurred to me that if spasm could result in hypertrophy of the muscle, a most favorite seat for its development would be at the cardia in cases of cardio-spasm. But, as a matter of fact, in the comparatively few cases of cardio-spasm which have gone to autopsy hypertrophy has been absent or very slight, even after years of persistent and obstinate cardio-spasm. I spoke to Dr. B. W. Sippy, who has seen more cases of cardio-spasm than most observers, in reference to this point, and he stated that he himself had been impressed by the same fact; that if spasm of the pylorus is the cause of the hypertrophy in these infantile cases, then the same or a similar condition should be expected to occur at the cardia, but it has never been observed.

Oesterich (*Deutsch. med. Wochensch.*, 1895) also believes that it is impossible for this condition to result from spasm, and considers it an error of development.

PROGNOSIS

Where so much uncertainty may exist as to the exact diagnosis of the condition present — whether spasm or real hypertrophy — the prognosis must always be guarded. In the severe cases it is practically always rapidly fatal without operation, but seemingly severe cases have been reported as cured without operation. In the milder cases, with partial occlusion only, the prognosis is more favorable, but still uncertain, because of the frequent occurrence of exacerbations. In the mixed cases where spasm and hypertrophy both seem to play an important part, the outcome must be considered very problematical, especially as the opportunity to operate at the most favorable time may be lost by dilatory tactics, or the wrong diagnosis may be made, on account of the deceptive or anomalous clinical course, as evidenced by temporary amelioration of symptoms, gain of weight, etc., as in one of Cautley's cases, in which a palpable tumor was even present. On the other hand, the numerous operations which have been performed later in childhood or in adult life for pyloric obstruction, in which the history extends back many years, and in which, at operation or autopsy, conditions similar to those described as above have been found, and which the authors (Landerer, Maier, Maylard) consider to be of congenital origin, show that mild degrees of obstruction can be either recovered from or tolerated for many years, and death even be due to an intercurrent affection.

INDICATIONS FOR OPERATION

These are hard to define absolutely. Scudder says all are practically fatal without operation. Shotten states categorically that operation is the only hope in true hypertrophic stenosis. Neild, Ibrahim, and others, believ-

ing that spasm is the underlying feature, claim that a majority would recover under medical treatment. The mortality of operated cases has been about fifty-four per cent. The mortality of cases treated medically is hard to determine, because many apparent cures may have been errors in diagnosis. According to Shaw and Elting, of 104 cases diagnosed as pyloric stenosis and treated without operation, 27 recovered and 77 died, and in 66 of the fatal cases autopsy confirmed the diagnosis, so that the mortality of this group is nearly 75 per cent. This may be even too low a rate, as there were probably some errors of diagnosis in the 27 cases which recovered. In several cases recovery was only temporary, as the symptoms recurred later, and operation had to be resorted to, after all. This, however, has its advantage, in that the child is older and stronger, and better prepared to withstand operation.

In the severer types in which vomiting is continuous, loss of weight progressive, absence of fæces in stools constant, and perhaps peristalsis visible, with or without dilatation or palpable tumor, the indication to operate is clear. In the milder cases, failure to effect amelioration of symptoms by the ordinary means of treatment within a reasonable period should be considered as an imperative indication for operative procedures before the child becomes practically moribund, as has been the condition in most of the surgical cases. In mild cases, also, where periods of improvement and relapse follow each other, operation should be seriously considered during the quiescent stage, as otherwise it may be too late when absolutely indicated, as in several reported instances.

The determination of the proper time to operate in a given case is perhaps the most difficult and most important aspect of the case.

TREATMENT

Medical. The constantly increasing number of cures reported as resulting from dietetic and medicinal treatment would appear to demand a trial of such means in those cases not excluded by the extreme severity of the symptoms. Many plans have been successfully tried. As there is no evidence of gastric indigestion, the continuance of breast-feeding would seem advisable, but many have preferred artificial feeding — whey, modified milk, barley-water, patent foods, etc., all having been successfully used. The feedings should be regularly given, and the amount small at first, gradually increasing the quantity as condition improves. Gastric lavage has seemed to be an important adjuvant at times. Rectal alimentation may render some assistance when the irritable stomach cannot be controlled, by allowing rest to that organ. As to drugs, opium has been used by Neild in two cases, in which he claims to have palpated a pyloric tumor, in doses of about 1-240 minim of tincture opii, but sufficient time has not elapsed to be positive as to the permanency of the cures. In cases where hydrochloric acid is in excess, antacids, especially Carlsbad water, is recommended.

Surgical. In searching the literature up to June, 1906, I have found reports of 156 cases, and the present case makes 157. Details of five recent cases were not accessible (Hilsum, Lothior, Starck, Wernstedt, Bloch). Eighty-five operations have been reported, not including the case here recorded, and I have personal knowledge of the three cases spoken of above, operated in Chicago since I presented mine. Two of these recovered (gastro-enterostomy posterior: Capps and Bevan; Walls and Van Hook) and one died (gastro-enterostomy posterior: Walls and Van Hook). So the total number of operations amounts to 89. These may be summarized as follows:

	No.	Recovered	Died	Mortality
Pylorectomy	1	0	1	100%
Divulsions	17	8	9	53%
Pyloroplasty	12	6	6	50%
Gastro-enterostomy	59	29	30	51%
	89	43	46	53.9%

The variety of gastro-enterostomy employed is not stated in many cases, especially the earlier one, but considerably over fifty per cent of those given in detail were posterior operations.

In fourteen recent operative cases, the results of anterior and posterior operation appear thus:

Anterior gastro-enterostomy:

Recovered	Died
1. Franke.	1. Robertson.
	2. Schmidt.
	3. Rotch and Ladd.
	4. Thompson.

Posterior gastro-enterostomy:

Recovered	Died
1. Scudder.	1. Morse and Murphy.
2. Townsend and Scudder.	2. Barling.
3. Rogers.	3. Walls and Andrews (personal communication).
4. Rotch and Ladd.	
5. Capps and Bevan (personal communication).	
6. Walls and Andrews (personal communication).	

The suture operation has been almost exclusively employed. The Murphy button was used in one case (Meltzer and Meyer), but unsuccessfully. The first operations were gastro-enterostomies. Stern operated in June, 1897, and Meyer in 1898, but both these patients died. Löbker performed the first successful operation (gastro-enterostomy) in July, 1898.

CHOICE OF OPERATION

Pylorectomy is too severe, and also unnecessary. Divulsion (Loreta) has a mortality of 53 per cent — higher than the remaining two procedures, and far too great for the nature of the operation, and also for the possible benefit to be derived. One case, at least (Nicoll), had to have a subsequent gastro-enterostomy, and sufficient time has not elapsed in many to be sure of its permanency. However, it is a rational procedure in cases where spasm is an important feature. Divulsion and gastro-enterostomy may be combined (Nicoll). Pyloroplasty and gastro-enterostomy each have their advocates, and the mortality is so nearly the same in both that it becomes almost a matter of personal preference. However, fifty per cent seems a rather high rate for pyloroplasty. Dent favors pyloroplasty, which, to most operators, has seemed technically improper or impossible, and claims that it is easier to perform, takes less time, and furnishes as favorable results as gastro-enterostomy. He mentions 14 cases in which pyloroplasty was done, with 7 deaths and 7 recoveries (50 per cent), although 2 died later of gastro-enteritis. Four of his last five cases have been cured by pyloroplasty.

Most operators have preferred gastro-enterostomy, and the posterior route is the favorite method. Kocher's operation would seem rational, and has been successfully performed by Shaw and Elting. Scudder stated in his first paper that a Finney operation would be appropriate, but later altered his opinion, as it is technically impracticable. As to the relative merits of the anterior and posterior methods, the same arguments which seem to favor the latter in adults — principally the avoidance of the loop, the lesser possibility of jejunal ulcer, and the more normal maintenance of the anatomic relations of the viscera — would hold good here. The arguments in favor of the anterior route refer mainly to the greater ease and less time necessary for operation, the less exposure and handling of the bowel, and the later complications due to adhesions, hernia, etc., which latter can be easily provided against, but the table above given, showing that in five cases in which the anterior operation was done only one recovered, while in nine posterior operations six recovered, would indicate that the posterior route is safer as well as more logical. The loop has been used frequently without ill results, up to the present at least. Jejunal ulcer has followed only one operation — an anterior gastro-enterostomy (Mikulicz). The Murphy button and the McGraw ligature are not appropriate.

AFTER-TREATMENT

Avoidance of shock and hemorrhage are essential during and after operation, and the former can be combated by warmth, saline infusion or transfusion, if necessary, and mild stimulation. Rectal feeding or saline enemata may be employed for a few hours or longer. Food *per orem* can be administered in a few hours or the next day, and this is often necessary quite early, on account of the precarious condition of the child and its imperative need of nourishment.

CAUSES OF DEATH

In most instances this might properly be attributed to a tardy diagnosis, as a majority of the patients have been practically moribund when placed on the table, and died within a few hours, not being able to withstand the shock and the slight hemorrhage which is inevitable

in such an operation. This was the case with the author's patient — the child having lost one pound during the twenty-four hours previous to the operation. Other causes of death were mostly due to errors of technique; e. g., rupture or perforation following divulsions, imperfect suturing, unsuitable methods (button), failure to take care of redundant mucosa at site on operation, hemorrhage from the abdominal wound after operation, etc. Jejunal ulcer in one case was mentioned above. Local peritonitis was the cause in another (Rotch and Ladd). Gastro-enteritis existing before the operation was fatal in Robertson's case. Broncho-pneumonia was frequently the fatal factor.

RESULTS

Although the time elapsed since operation has been too short in most cases to judge finally as to permanent cure, many cases have been followed for from one to three years, and no recurrences are reported following gastro-enterostomy or pyloroplasty. The only case in which a subsequent operation has been necessary was a Loreta (Nicoll). Of course a sufficiently long period has not passed, either, in which to look for reports of the complications which occasionally have followed gastro-enterostomy in the adult.

TABLES

Gastro-enterostomy

	Recovered		Died
1898.	Löbker.	1897.	Stern.
1899.	Abel.	1898.	Meyer (Meltzer).
	Fritzsche.		Meyer.
	Kehr.		Stiles.
1900.	Kehr.	1899.	Löbker.
	Stiles.	1900.	Mikulicz.
	Nicoll (5).	1901.	Jordan.
1901.	Monnier.	1902.	Jordan.
	Trautenroth.		Braun.
1903.	Shotten.		Shotten.
	Stiles.	1903.	Mackay.
	Freund.		Jakh.
1904.	Giles.		Gallant.
	Munro.	1904.	Bull and Greeff.
	Elting.		Munro.
	Stiles (2).		Bottomley.
	Nicoll.		Stiles (3).
	Franke.		Nicoll (3).
1905.	Townsend and Scudder.		Pinner.
	Rotch and Ladd.		Thompson, G. F.
	Capps and Bevan.	1905.	Schmidt.
	Walls and Van Hook.		Morse and Murphy.
1906.	Scudder.		Robertson.
	Rogers.		Barling.
	(29 cases.)		Rotch and Ladd.
			Walls and Van Hook.
			(30 cases.)

Divulsions (Loreta)

	Recovered		Died
1899.	Nicoll.	1901.	Gruneberg.
1900.	Schmidt.	1902.	Lendon.
1902.	Stiles.		Stiles (3).
1903.	Burghard (2).	1903.	Nicoll.
	Nicoll (gastro-enterostomy three months later).		Mackay.
			Stiles (2).
			(9 cases).
1904.	Stiles.		
	Grisson.		
	(8 cases.)		

Pyloroplasty

	Recovered		Died
1902.	Dent.	1900.	Braun.
1903.	Dent (2).	1902.	Dent.
1904.	Guthrie (Murray)		Granboorn.
	Dent (2).		Gillavry.
	(6 cases.)		McCaw and Campbell.
		1905.	Schmidt.
			(6 cases.)

Pylorectomy

Died
1900. Stiles (Thomson).
(1 case.)

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A CASE OF ISCHURIA IN A PATIENT WITH RETROFLEXIO-VERSION OF THE GRAVID UTERUS[1]

BY E. N. REED, M.D., CHICAGO
Cook County Hospital

MRS. J. S., aged 36 years, a housewife, was admitted to the service of Dr. Rudolph W. Holmes at the Cook County Hospital on March 11, 1906, complaining of pain in her abdomen, and inability to urinate. She had menstruated last on the 7th of the previous December, or about three months before admission.

The patient stated that she had had five full-term children, of whom four are living and well, the fifth having died at sixteen months, of whooping-cough.

She had had seven miscarriages, as follows: First pregnancy terminated at 8 months; second pregnancy miscarried at 5 months; eighth pregnancy miscarried at 2 months; ninth pregnancy miscarried at 2½ months; tenth pregnancy (twin) miscarried at 5½ months; eleventh and twelfth pregnancies both miscarried at 2½ months.

The ninth miscarriage was induced by taking medicine. The others, patient states, were spontaneous.

The pregnancy at time of admission was the thirteenth.

The patient stated that she had bled from time to time with all her pregnancies. She says that in the present pregnancy her abdomen began to enlarge noticeably two months before admission, or after one month's duration of the pregnancy. She had a good deal of nausea, but no other unusual symptom, until three days before admission to the hospital. At that time she desired to urinate, but, owing to lack of convenience, she held her urine for half an hour, then tried to urinate, but was unable to do so. She then began to have pains — periodical and rhythmical, she stated — and resembling labor pains, for which they were mistaken when she was sent to the hospital. With these pains was a constant desire to urinate. She attempted urination repeatedly, but was able to void only a few drops of urine each time.

On admission to the hospital, an attempt to catheterize her was made by a nurse, who succeeded in withdrawing only three quarters of an ounce of urine, although the catheter was introduced a considerable distance into the urethra.

The patient stated that she had never experienced any such difficulty in previous pregnancies.

1. *Abdominal Examination.* A tumor was found in the abdomen, extending two fingerbreadths above the umbilicus, ovoid in shape, fluctuating, dull on percussion, extremely tense, and seemingly contracting. No fœtal parts could be felt. Neither fœtal heart tones nor placental souffle could be heard.

2. *Vaginal Examination.* A rectocele was visible posteriorly. The cervix was found just behind and above the symphysis pubis, pointing downward and forward. It was not noticeably shortened, and not softened. The cervical canal was not patulous. On either side of the cervix was found an elastic, fluctuating, bulging mass, which could be followed almost entirely across the pelvis from one side to the other. A sulcus could be felt between the bladder and the body of the uterus. Posteriorly, the entire cul-de-sac was filled with the enlarged, elastic body of the uterus.

The patient was catheterized at two P.M. with a

[1] Read by invitation before the Chicago Gynecological Society, May 25, 1906.

soft rubber catheter. After introducing this a considerable distance farther than is usually necessary in the female, urine flowed freely, and forty ounces, clear and amber-colored, were withdrawn. At six P. M. forty ounces more were drawn off, and at twelve midnight another forty ounces. At ten A. M. and at three P. M. of the next day forty ounces were withdrawn; at seven P. M., only thirty ounces were obtained. The patient was catheterized every four hours throughout the following two days, progressively smaller amounts of urine being obtained. On the fourth day she was able to void her urine.

After each catheterization the patient was placed in the knee-chest position for ten to fifteen minutes.

On vaginal examination during the third day it was found that the uterus had assumed its normal anteverted and anteflexed position.

Two days later, the patient was discharged. At the time of discharge the uterus was in normal position.

A number of theories have been advanced to explain the condition of ischuria with a retroverted and retroflexed pregnant uterus.

Dr. Charles B. Reed enumerates the following in the *American Journal of Obstetrics* for February, 1904:

1. That the displaced cervix, pressing against the posterior wall of the bladder, produces a valve-like fold of the bladder-wall.

2. That kinking of the urethra is the cause of the ischuria.

3. That elongation of the urethra with narrowing and eventual obliteration of its lumen is the causative factor.

4. Direct pressure of the cervix uteri against the urethra and neck of the bladder, producing a mechanical occlusion of the canal.

5. Kolischer found, upon cystoscopic examination of cases of ischuria, an œdema of the bladder-wall; and he believes this to be the ætiological factor.

6. Dr. Reed advances the hypothesis that the ischuria in these cases is the result of a pressure paralysis of the nerves controlling the bladder; that the misplaced uterus, at a certain stage of its growth, comes to press upon the hypogastric or pelvic nerves, either at their exit from the sacrum or somewhere in their course through the pelvis. This hypothesis, he holds, will explain the sudden onset of the ischuria, its occurrence at different times in the pregnancy, corresponding with the degree of the retroflexio-version; the fact that ischuria may be produced by pelvic tumors, other than the gravid uterus, when they are so placed as to produce pressure on these nerves; and several other features peculiar to this ischuria.

REPORT OF A CASE OF TORSION OF THE GREATER OMENTUM, INTRA-ABDOMINAL, WITH REMARKS

By F. D. SMYTHE, M. D., Memphis, Tennessee

MR. M. S. G., aged 30, merchant, married, family history good, height 5 feet 5 inches, weight 155 pounds; has been addicted, in the past, to the excessive use of alcoholics and tobacco; general health good. He wears a truss, and says that on two occasions, during the past ten years, the contents of the hernial sac were difficult to reduce. The hernia was situated on the left side, and has not been down for several years.

He has never suffered from any serious illness. During the past two years he had two slight attacks of appendicitis, which kept him in bed from one to two days, though the pain and tenderness did not disappear for several days after either attack.

Patient had been in a sanitarium in this city for two weeks, undergoing treatment for the whisky habit, and had left off the use of whisky for ten days prior to the attack of omental torsion. He retired Sunday night feeling as well as usual, having eaten his usual Sunday night supper. About 2 A. M. Monday morning he was awakened with a severe griping pain over the lower portion of his abdomen, most marked to the right of the median line. The soreness was general, and the pain was increased by pressure. Nothing was done for the relief of the pain, which continued to increase in severity, at intervals, through the day, until about 6 P. M., when morphine was given. After this time, at intervals of a few hours, he would have exacerbations of pain that were almost unbearable. He described the sensation at such times as though something was being wrung or twisted within him. Morphine was given repeatedly Monday night and Tuesday. Complete relief was not obtained. His temperature during the day on Monday was found to be near 100° F. The highest point reached was 100½°. Pulse varied from 88 to 110. Tuesday morning the temperature was 100°; pulse, 90. During the day, temperature averaged 100°; pulse, 100.

I saw him Tuesday afternoon and found him with a temperature of 100 2-5°; pulse, 100; facial expression that of fright; capillaries dilated; abdomen distended; rigidity present (but not board-like) over the entire lower two thirds of the abdomen. Patient was not nauseated, nor had he suffered from nausea since the onset of the attack.

Upon admission to the hospital patient was suffering with considerable pain and distention. Pulse 132; temperature 100 2-5°. Quick pulse, due to excitement, plus a twelve-mile ride in an ambulance, from the sanitarium to the hospital. Palpation revealed

some muscular resistance over the abdomen, most marked to the right of the median line, from the navel downward. A large tumor was easily outlined through the thick abdominal walls, and it was noted that palpation could be more satisfactorily practised than is usual so soon after an acute attack of appendicitis. Appendicitis was the diagnosis made by the attending physician, and while the symptoms were not those typical of appendicitis, and I so stated, yet I concurred in the probable diagnosis.

Upon entering the peritoneal cavity, a large quantity of colored serum immediately escaped. A huge black mass was observed immediately over the viscera, directly under the incision, pointing downward, and reaching as far as the floor of the pelvis. The mass was confined to the right side, and was separated without difficulty from the adjacent viscera. It was in a condition almost ready to break down, as a result of the complete strangulation which existed. The involved portion consisted of more than one half of the greater omentum. Recent adhesions existed around the pedicle and field occupied by the strangulated omentum.

The omentum was carefully untwisted to prevent injury, and was ligated in sections one inch above the neck, and divided with scissors. The veins were very much distended, many of them being as large as a man's index finger. The amount involved was certainly enormous, and was a bulky mass. This was my first experience in dealing with a mass of torsion of the greater omentum, purely intra-abdominal.

The strangulated portion of the omentum was confined to the right side of the abdominal cavity, and had no connection with the hernial sac, which was located on the left side and was empty. It was entirely intra-abdominal, and six complete twists formed the pedicle. By careful handling we were enabled to remove the mass intact, which, briefly described, is as follows: Measurements from last twist of pedicle to the lower border of omentum, 10 inches; latterly, above the neck, 12 inches. The strangulated portion terminated in a form somewhat oval in shape. It was black in color, with numerous veins, enormously distended, and was made up of that portion of the omentum from the transverse colon downward.

The patient made an uneventful recovery.

The literature on the subject of torsion of the omentum is extremely limited. I find in the *American Journal of Medical Science* for August, 1905, an article entitled "Torsion of the Great Omentum," by Edward M. Corner, F. R. C. S., and H. Ervin Pinches, M. D., of London, England. They report all cases on record up to that time, and add four cases of their own of torsion of the great omentum, one of which was of the intra-abdominal variety, thus making six cases in all of torsion of the omentum belonging to this class. My case constitutes the seventh case of this interesting and infrequent condition.

The records show that twelve and one half per cent of the cases compiled by these gentlemen were, primarily, cases of torsion of the omentum, within the hernial sac, the twist being confined to that portion of the omentum imprisoned within the hernial sac. The other case belonged to the class where the twist originated in the hernial sac and extended beyond the internal ring and up into the abdominal cavity. Forty-one of the fifty-three cases belonged to this variety.

Torsion epiplocele is not a rare condition. All surgeons doing much hernial work have seen it; many surgeons, many times; so it should not be confounded with the extremely rare and interesting condition of uncomplicated torsion of the greater omentum, intra-abdominal.

DIFFERENTIAL DIAGNOSIS

The diagnosis of appendicitis was made in six of the seven cases reported, including that of the essayist. The other case was diagnosed as suppurating hydatid of the omentum.

From the meager statistics available, appendicitis is the only condition that we need seriously consider when trying to arrive at a diagnosis of intra-abdominal torsion of the omentum. The symptoms of acute appendicitis are pathognomonic, and are so well known and so readily interpreted by surgeons, that error in diagnosis would seem almost unpardonable. No disease is capable of producing the train of symptoms that result from acute inflammation of the vermiform appendix.

The following are symptoms of torsion of the omentum, intra-abdominal, as observed up to date, together with prominent and important symptoms of appendicitis:

TORSION OF OMENTUM	APPENDICITIS
1. *Age:* Usually between 35 and 55; the largest number occurring during the fifth decade.	1. *Age:* Usually a young man, between the ages of 15 and 25; *i.e.*, the largest number occurring in patients, young and active, between the ages of 15 and 25.
2. *Sex:* Practically all cases occurring in the male. Percentage occurring in the female not stated, but rare.	2. *Sex:* Male predominating; the ratio about 6 to 1.

3. *Pain:* Situated in the right iliac fossa in 85 per cent of cases. In my case the pain was general at the outset, and later confined to the right side, from the navel downward.

4. *Vomiting:* Infrequent in cases of omental torsion.

Nausea: Absent in majority of cases, and when present is evidence of serious complications.

5. *Pulse:* Not so much affected; varies from 80 to 100; generally under 100.

6. *Temperature:* Ranges from 99° to 101°; rarely reaches 102°. An interesting fact observed is, that the temperature is but little affected, comparatively; usually it is from 100° to 100 2-5°.

7. The pain is not so sudden or violent as in appendicitis; and the tumor, or mass, can be made out early by palpation; much earlier than in appendicitis.

8. *Rigidity:* The abdominal muscles offer some resistance, though not to the same extent as in appendicitis. Pressure over the mass is not so painful in the case of great omental twist as in the case of appendicitis.

3. *Pain:* In acute appendicitis, sudden; always precedes elevation of temperature; may be general over low abdomen, early; in short while, limited to the right iliac fossa — McBurney point.

4. *Nausea and Vomiting:* Not infrequent in cases of acute appendicitis, and obstinate constipation is very commonly associated with the disease. Purgatives, when given, often fail to have effect.

5. *Pulse:* In really severe cases, usually fast; after a few hours, varying from 102 to 140.

6. *Temperature:* Usually higher, ranging from 101° to 103°–104°.

7. The pain in cases of acute appendicitis is sudden; very violent and paroxysmal. The patient will often cry out for morphine for its relief.

8. *Rigidity* of muscles is marked early in the history of the disease, and pain is greatly increased by even light pressure; so much so, that in many instances the right lower quadrant cannot be palpated.

9. *Percussion* should be practised in all cases, and will prove of great help in establishing the diagnosis. Superficial percussion in cases of omental torsion displays dullness; not so in acute inflammation of the appendix at the outset.

10. The mass, or tumor, is tender upon pressure; is more or less doughy, and of a good size, and can be rather readily outlined from the start.

11. Facial expression one of fright; fairly good, however; may become anxious later.

It is quite evident from the outset that the case with which you are dealing is not so grave as fulminating appendicitis, though will terminate fatally if not relieved by surgical effort.

9. *Percussion* reveals, during the early stages of the disease, a resonant note.

10. *Tumor:* The serum does not become organized sufficiently to enable one to detect the mass.

The mass, tumor, or swelling cannot be detected early in cases of acute appendicitis — not before second or third day; oftentimes even later. It is more circumscribed than and unlike the irregular, doughy mass felt in cases of omental torsion.

11. Facial expression anxious; becoming more so with increasing pulse-rate and abdominal distention in cases not recognized early and subjected to prompt surgical treatment.

General appearance of the patient is that of one extremely ill.

No single surgeon has seen more than one case to date, and up to the time of his unexpected case, his attention, in all probability, has never been called to a case of omental torsion; and that explains, in my judgment, why the diagnosis has never been made of torsion of the greater omentum prior to operation.

Appendicitis and torsion of the greater omentum, intra-abdominal, present some symptoms in common, but when viewed as a whole there is such a wide difference in the clinical pictures of the two diseases, that error in diagnosis should not occur to the surgeon meeting his second case.

DEPARTMENT OF TECHNIQUE

THE HIGH OPERATION FOR VARICOCELE

By DEAN D. LEWIS, M. D., Chicago

The high operation for varicocele has certain advantages. The operation is performed in a field which can be readily sterilized, thus reducing the dangers of infection, and the scar is removed from the irritating secretions about the scrotum.

The operation is readily performed under local anæsthesia and through a small incision. The skin in the line of the incision is infiltrated with a 1-1000 cocaine solution. A longitudinal or transverse incision may be employed; probably the latter is the more satisfactory.

The center of the transverse incision of three fourths to one inch in length corresponds to the external abdominal ring, and is slightly above it. The skin and the fascia are incised, and the structures composing the spermatic card are lifted up on a Kocher's director. The intercolumnar, cremasteric, and transversalis fasciæ are next incised parallel to the cord. This permits of the separation of the veins of the pampiniform plexus, from the vas deferens and its accompanying veins. The veins of the plexus are next ligated and resected, the extent of the resection depending upon the size of the varicocele. The veins accompanying the vas deferens are undisturbed. The ligatures applied to the veins to be resected are left long and tied later. This elevates the testicle. The spermatic artery is sacrificed in this operation, but the artery accompanying the vas deferens provides for the nutrition of the testicle.

The fascia is next sutured with fine catgut, and the skin with horsehair. A triangle bandage is applied to support the scrotum and testicle.

It is advisable to keep these patients in bed from eight to ten days, until the organization of the thrombus is complete. Unfortunate accidents, such as pulmonary embolism, have resulted from early activity on the part of the patient.

MANAGEMENT OF BREECH PRESENTATIONS[1]

By HENRY F. LEWIS, M. D., Chicago, Illinois, and South Haven, Michigan

There is a varied nomenclature for presentations of the pelvic end of the fœtus. The generic name of "Beckenendlage" of the Germans (pelvic-end presentation) is most expressive and best describes the true condition. In English, the term "breech" is generally employed to express this state of affairs, although the word would seem to be applicable only to the presentation of the buttocks alone. Numerous authors describe many varieties of the presentation. Williams uses the term "frank breech," meaning presentation of the breech alone with the legs extended against the belly of the fœtus. He also, like many other authors, calls a complete breech that condition in which the breech presents at the parturient opening with the legs flexed so that the feet are felt by the examining finger. A half-breech means one where one leg is down completely and a complete footling one where both feet are down and are born before any other part of the body. German writers call a frank breech a simple breech the complete form a double breech and they speak of a partial and complete footling.

The frequency is stated somewhat differently by different observers but we may say, in round numbers, that from three to four per cent is correct. This percentage includes all cases of breech presentation. As we know that nearly half the cases are premature, we shall get a trifle less than two per cent of all cases of labor at full term having the pelvic end of the baby presenting.

It may be stated that the back of the fœtus is towards the mother's left a little more frequently than towards the right. In the majority the breech settles into the pelvic inlet in the left oblique diameter; that is, with the sacrum forwards, the

[1] Read before the Kalamazoo Academy of Medicine, July 24, 1906.

right hip posterior and the left hip anterior. Therefore the back of the child is usually felt in the left front of the mother's abdomen and the head in the right hypochondrium while the small parts are felt in the right flank. The fœtal heart tones are usually heard at a little above the level of the umbilicus early in labor or towards the end of pregnancy and an inch or two to one side, rather more commonly to left. The position with the back anterior is probably the most common, because it is easier for the flexed body of the fœtus to fit its soft concave abdomen against the spinal column of the mother than the hard convex back. This same reasoning, of course, also applies to the other presentations.

The usual mechanism of breech presentations is as follows: As the breech enters the oblique diameter of the pelvic inlet, the anterior hip is the lower and so strikes the pelvic floor first. Therefore it rotates to the front and, as the breech enters the inferior strait, the two hips are in a line with the anteroposterior line of the woman's pelvis and appear thus at the vulva. In case of a child of normal size, by the time the fœtal pelvis is entirely outside of the parturient canal, the shoulders are entering the superior strait, in the same oblique diameter as the breech did. Therefore the child's body is somewhat twisted and, as the parturient canal is markedly curved, the body of the child must also be curved to about thirty degrees. As soon as the fœtal shoulders have passed the superior strait the head begins to enter it. The long axis of the head is normally at right angles to the long axis of the breech and the shoulders. Therefore, normally, the head enters in the oblique diameter opposite to that in which the breech and shoulders entered. The anterior shoulder does not usually rotate forwards but slightly backwards and the posterior shoulder comes partly forwards, so that the birth of the shoulders through the inferior bony strait and through the vulva is more or less in a transverse diameter. The reason for this is as follows: Since the shoulders are still in an oblique diameter when the hips make their exit from the pelvis, there is a tendency for the body to turn back upwards. This tendency is usually, indeed, aided by the obstetrician. Therefore it is not, with the passage of the shoulder, the lower shoulder which rotates forward, because it strikes the pelvic floor first, but successive sections of the sides of the abdomen and chest of the fœtus which play the part of lowest point and therefore rotate towards the front of the mother's pelvis and carry the posterior shoulder forwards with them. In the same way the occiput is guided by the body and shoulders to rotate forwards and to pass out under the symphysis pubis. Changes in this usual mechanism are very common and manual aid to the passage of the child's body affects the mechanism very much. Even when the labor starts with the back of the child posterior, it is usually not difficult to rotate the body and shoulders by means of the hands so that the head will finally come out with the occiput anterior and therefore in the most favorable position.

The greater difficulty of delivery of an after-coming head with the face anterior and under the pubes makes it the duty of the obstetrician to watch his breech cases with the greatest care and not to leave them, except in competent hands, after the breech has come well down into the pelvis. If he is on hand and takes the proper precautions, he will almost always be able to steer the body with its back towards the front and so maintain it in the most favorable relation for the final passage of the head. Of course, when the child is small there will be no mechanism of labor recognizable and the infant can be born in almost any way. In half the cases of breech presentation the fœtus is premature and, in a certain percentage of the remainder, it is one of twins and consequently small but in the rest of the cases the mechanism will usually follow the above course and watchful care will be desirable.

The prognosis for both mother and child is worse in breech than in vertex presentations. Hecker reckons for the mother a trifle more than two per cent mortality in breech presentations, as against 1.5 per cent in cases of vertex presentation. The reason for this increased mortality lies in the greater danger of lacerations, as the after-coming head is quickly delivered, and in the greater danger of infection because of frequent operative interference. Artificial aid is required in breech cases in at least twenty-five per cent, in the interest of the child.

The prognosis for the fœtus is greatly affected for the worse by breech presentation. Observers differ as to the usual percentage of fœtal mortality during labor in such cases. Winckel estimates it as high as twenty per cent, including all cases, and thirteen per cent, including only full-term cases. The conditions for the child are more favorable in multiparæ than in primiparæ, owing to the easier passage of the head in the latter. Williams estimates the mortality in primiparæ as ten per cent; slightly less in multiparæ. Porak estimates that eleven per cent of children die during labor in primiparous deliveries and about 3.5 per cent in multiparous confinements. Wetzel's figures, based on five hundred cases of breech presentation in Königsberg, show a fœtal mortality, in general, of thirteen per cent. Of the cases delivered spontane-

ously or with manual assistance alone the mortality was 11+ per cent. Of the cases where extraction was performed the mortality was nineteen per cent. The cases were from the hospital and from the outpatient department. There was probably not an excessive proportion of difficult cases. The reasons for the increased mortality of the children during labor with breech presentation are various. In seven per cent of breech labors the cord prolapses. In many cases, owing to the retraction of the almost empty uterus after most of the body has been born, the placenta becomes prematurely detached and the child consequently becomes asphyxiated. When the shoulders are passing the inferior strait — that is, about when the scapulæ have come into view — the cord is very likely to be compressed between the head and the pelvic walls. Therefore it may be said that there is about from eight to ten minutes after that time in which the head must be delivered in order to save the child. It is very rare for any child whose cord has been compressed any longer than this to be resuscitated. Indeed, deep asphyxia often comes on in a much shorter time. When the os is incompletely dilated its margin is likely to compress the cord even sooner.

In the consideration of the obstetrician's management of cases of breech presentation it must first be remembered here, as everywhere else in obstetrics, that nothing should be done unless there is some scientific reason for it. The most successful cases of labor are those wherein the accoucheur maintained a "masterly inactivity." The presence of a breech, *per se*, is no valid indication that some interference should be instituted. Right at this point we come to a point of dispute. Probably the majority of authorities, especially the German authorities, advise that no interference be attempted unless some indication of danger to the mother or to the child arises. Others, especially the French and many Americans, advise that prophylactic external cephalic version be performed either before the end of pregnancy or at the beginning of labor.

On the one hand, it is argued that breech cases, in the great majority of instances, will proceed to a happy termination without any interference at all. External version performed during pregnancy or even at the beginning of labor does not insure that the presentation will remain corrected; indeed, it is certain that, done during pregnancy, the prophylactic version is usually without permanent result, even when the patient is trussed up with complicated and cumbersome abdominal bandages. Even when the operator waits until labor pains have begun before attempting external version, he is by no means sure that the vertex presentation thus artificially produced will not soon again be changed into the original breech. When we consider the causation of breech presentations we can understand why it is so difficult to secure permanent results from external version. Excess of amniotic fluid, abnormal shape of the uterus, abnormal lay of that organ, excessive size of the child's head, placenta prævia, irregularity in the painless contractions, etc., are not changed by the operation. Some of these causal factors may be overcome if, after the completion of the version, the membranes are ruptured and the waters drained away. Thereby, however, we add another element of interference, in itself unfavorable. External version may proceed well up to a certain point and then fail, leaving the fœtus in a transverse presentation, the most unfavorable of all and impossible of spontaneous delivery. When the child is in the transverse posture the membranes may rupture and the uterus contract and retract upon its body so that it will be impossible to complete the version to the point intended. It may then be even dangerous to perform internal podalic version, the only other possible operation. In general, the prognosis of breech presentations is more favorable the less the interference or, if there must be interference, the longer before that interference is indicated.

On the other hand, advocates of the prophylactic external cephalic version urge that breech presentations have intrinsically twice the mortality for the mother that vertex presentations have and a very high degree of fœtal mortality. This last may conservatively be set down at ten per cent. *A priori*, it would seem that any procedure which would reduce a ten-per-cent mortality to normal must be a good procedure. External version, while it requires some skill, does not add to the danger, unless it leaves the fœtus in a transverse presentation. Certainly that danger is a remote consideration in the face of its prevention of a ten-per-cent mortality. In the face of these conflicting authorities, I have evolved a rule of personal conduct which I can recommend, albeit upon my own rather limited experience.

When a case presents itself some time before labor so that the conditions can be carefully studied, pelvic measurements taken and examinations made which leave no doubt of the diagnosis of breech presentation or of the otherwise normal character of the case, I would always consider the question of prophylactic external cephalic version. Because of the almost impossibility of maintaining the artificial cephalic presentation, I would not attempt the version until labor pains of the first stage had begun. If I did not reach the patient until after the membranes had ruptured or until there had

been hard pains for several hours, I would not make the attempt. If the os was more than half dilated, I would refrain. If the pains had not been severe for more than an hour or two, if the abdominal walls were not too tense, if the patient was not too nervous or, if so, there were no contraindications to an anæsthetic, if the os was less than half dilated, if the child was alive and in good condition, if the presenting part was not engaged, if there was a good quantity of amniotic fluid, I would attempt external version. Unless the abdominal walls are very lax, complete anæsthesia should be attained and in any event with a primipara. If the version is an easy one I would persist but, if any difficulty arose, I would cease the attempt.

Watchful expectancy should be maintained throughout the whole labor in a breech case. After the breech is well engaged in the pelvic canal the obstetrician should remain within a few minutes' call of his patient. Whenever the mother's condition indicates danger to her or whenever the fœtal heart, as heard or as felt at the cord or some fœtal pulse, shows indication of danger to the infant, then interference should be at ready hand. As soon as the head begins to press upon the cord — in other words, as soon as the shoulder-blades appear at the vulva — liberation of the arms and extraction of the head by one of the approved methods must be immediately undertaken. In the absence of strict indications on the part of mother or child, no interference is justified. The labor will be a longer one than that of the usual vertex case; the soft structures of the breech impinging upon the pelvic floor and perineum will give less stimulus to pains than does the head; the contractions will not be so strong or efficacious; the intense subjective pain caused by the pressure of the uterine walls between the head in the fundus and the abdominal muscles will prevent the woman from giving the usual voluntary assistance in bearing down during the second stage. A skilled assistant or the obstetrician himself can do much service by firm manual pressure upon the fundus during pains directed in the axis of the superior strait. Especially towards the last, when the shoulders are passing, is it desirable to have this pressure upon the fundus to insure as complete flexion of the head as possible. If extraction of the arms becomes necessary or if traction upon the child's legs or body is performed, the aid of an intelligent pair of hands over the fundus will be invaluable. This factor, indeed, is the main one in preventing extension of the arms alongside the head.

After the breech is well engaged it is impossible to pull down a leg, if it should become advisable to hasten the delivery by traction upon the child. For some considerable time after engagement, indeed until the presenting part has passed at least half way through the parturient canal, it is difficult to hook a finger into a groin to act as a tractor. If valid reason for haste occurs during this period, we have very limited means of obtaining it. Therefore some authorities have advised and practised pulling down a foot as a prophylactic measure before the breech is so far wedged into the pelvic canal that this is impossible. The idea is to furnish a handle to be used whenever traction should be indicated during the progress of the case. The first objection is a general one, that a considerable risk of infection is added. The second objection is, that the half-breech is far more difficult of delivery by natural means than a full breech or a frank breech. The small extent of the half-breech does not dilate the soft parts as well, so that when the head comes to pass the os it is very likely to meet with obstruction at that point, and so to be extended. Also, the insufficiently dilated os may hold the arms as the shoulders pass and cause them to become extended alongside the head. Besides the danger to the fœtus in these ways, there is the danger of lacerations of the partially dilated os, lacerations which may extend far into the cervical tissue. It is only justifiable to pull down a foot when there is good reason to believe that there will arise some indication for hasty delivery. Such a reason will be threatened eclampsia, threatened lack of compensation in heart disease, placenta prævia or threatened exhaustion of a mother subject to wasting chronic disease.

In the large majority of cases of breech presentation the duties of the obstetrician will be limited to careful watchfulness or to the so-called manual aid. The obstetrician should bear in mind that nothing should be done by him without proper indications and this rule holds good in breech presentations as much as in normal presentations. There is often great temptation to release a leg and pull down upon it in order to hasten labor. Even such a slight interference increases, be it ever so little, the chances of infection. Besides this danger, traction upon the fœtus adds more or less to the chances of extension of the head and of extension of the arms alongside or above the head. Nature, unaided here as elsewhere, will in most instances do better work than the most skillful obstetrician. The longer obstetrical interference can be postponed, the better is the prognosis for mother and child. By these cautionary remarks I do not mean to imply that there should be any hesitancy on the part of the attendant in resorting

to the proper interfering measures when the indications are present. It will always be well for him to ask himself what these indications are and only to act when he can satisfy his critical *alter ego* that the scientific indications for the procedure in mind are actually present. As labor advances, the probability that scientific indications for some sort of interference will exist becomes greater and greater.

It is not often necessary to release the legs. Even in cases of frank breech, with the limbs stretched alongside the belly of the child like splints, the thighs flexed and the lower legs fully extended, it is not always necessary to bend the knees and let the limbs out. However, if labor delays for an hour or so with the buttocks at the vulva and it appears that the position of the limbs is the factor which is causing the trouble by interfering with the normal curving of the body within the pelvic canal, it is eminently proper to release the legs one by one. This is done by passing the hand between the posterior leg and the posterior wall of the vagina, palm upwards, slightly abducting the thigh, reaching upwards above the knee and flexing the lower leg by bringing it forward towards the median line of the child's body. Thus the foot is brought to the vulvar outlet and then can easily be drawn out. The second or anterior leg is usually released with ease by the same maneuver, performed with the opposite hand.

Manual aid is much more frequently called for to effect the release of the arms than the legs. Especially after efforts at traction the arms are apt to have been more or less extended and therefore interfere with the advance of the after-coming head. The child too is not far from the danger point when the cord becomes pressed upon. The hand of the operator corresponding to the posterior arm of the child is passed along the child's back, over the shoulder and upwards upon the arm. As it passes along the arm the fingers essay to pass the arm downwards across the face and front of the chest, sweeping towards the opposite side. The greatest force of this effort should be at the elbow, for fear of fracturing the humerus. While the internal hand is passing thus, the feet of the child are seized by the other hand and drawn sharply to the opposite side of the mother, rotating so as to bring the back of the child as much as possible to the front. The remaining arm can often be easily released by a similar maneuver under the pubes. Sometimes it may be necessary to draw the legs towards the opposite side, sweeping them downwards between the mother's thighs and thus rotating the anterior arm towards the rear. The perineal arm is usually easier to release than the pubic arm when both are within the pelvic canal. By the time it becomes indicated to release the arms it is usually the case that the shoulder-blades have appeared at the vulva and therefore the cord is being pressed upon by the head against the mother's tissues. Consequently haste with due care is commonly necessary for all the subsequent maneuvers.

When there has been a spontaneous labor as far as the shoulders or when traction has been performed but where a skillful assistant has been able to keep the head and arms flexed by proper external fundal pressure, the arms will usually be found folded below the chin and on the perineum. Their release is then easy. When extension has occurred from lack of the above skillful care, from malformation of the maternal pelvis or child's body or from other cause, the arms may be found in front of the face, alongside the head, behind the head, in the nape of the neck and the like. One or both arms may be in these abnormal positions. It is easier to start the manual release by passing the hand over the back of the fœtus first, then coming towards the front over the shoulder. In some cases it may be necessary to rotate the fœtal body by grasping the part of it outside the mother's body so as to facilitate the release of the arms. The maneuvers vary according to the peculiar position of the individual case. The principle to bear in mind is this: to bring the arm to be first released into the hollow of the sacrum and to release it with the corresponding hand, then to bring the other arm, if necessary, also into the same position by rotation of the body and then to release it by means of the hand corresponding to the arm concerned. When, because of a narrow pelvis, a large fœtal head or other reason, it is impossible to free the arms from their imprisonment by the head, there are two last resorts. One may extract both head and arms together without releasing. This is the simultaneous extraction of head and arm. The alternative is deliberate fracture of the humerus. This gives a new point of motion in the arm and enables it to be released with less difficulty. The parents should always be warned of the intention to fracture the arm, because it is considered by the laity a mark of bad obstetrics to have a child born with broken bones. The fracture can be treated after birth and usually unites with a minimum of deformity. Simultaneous extraction of the head and extended arm is called the Deventer method. It consists in forcibly pulling downwards upon the legs and body of the child hanging between the mother's thighs while she lies on her back with her buttocks at the edge of the table or bed. It is a

strenuous method and many authorities prefer deliberate fracture of the arm.

With an arm and head arrested above the pubes, the method of Müller may prove efficacious. This method is to draw down the body towards the perineum until the anterior shoulder is forced into the superior strait, into the pelvic canal and down to the lower border of the symphysis. Then, with the fœtal neck as a fulcrum, the body is drawn upwards over the mother's abdomen to an exaggerated degree and the posterior arm, with the head, is drawn along the posterior wall of the pelvis and made to emerge over the perineum.

In almost every case the attendant will be called upon to release the head. After the whole body has emerged from the mother, the head remains within the pelvic cavity but almost or entirely outside of the uterus itself. Therefore there is no uterine expulsive force from behind to expel the head and the general abdominal pressure caused by the action of the voluntary muscles of the abdomen is the only *vis a tergo*. As we know with what difficulty in vertex presentations the head is forced out of the pelvis even with the full action of the uterine and abdominal muscles on the body of the child, we can realize why it is so seldom born spontaneously when it comes afterwards.

The number of methods of extricating the after-coming head is legion, although the real principles involved are few. The names of scores of shining lights in obstetrics adorn the literature of this phase of the subject. Indeed, hyphens abound here almost as much as in the history of operations for the shortening of the round ligaments. In all the methods flexion of the head is attempted. As to the other moves, there are three well-defined principles. The first consists of traction upon some part of the child's body or legs, the second involves pressure upon the fundus from above and the third is the application of the forceps to the after-coming head.

The type of the first principle, and one usually successful if rightly performed, is that attributed to Mauriceau, Smellie and Gustav Veit. I see no reason why it should not be called the Mauriceau method. After the arms have been freed, the left forefinger is passed into the child's mouth with the thumb held below the chin to prevent injury to the jaw. The body of the child rides prone on the arm of the operator. The index and middle fingers of the right hand are passed under the pubes to the occiput. By pushing up with the last and pulling down with the finger on the lower jaw the head is flexed. Then, still maintaining flexion by moderate traction on the lower jaw, the thumb and last two fingers of the right hand grasp the shoulders and pull downwards with the necessary

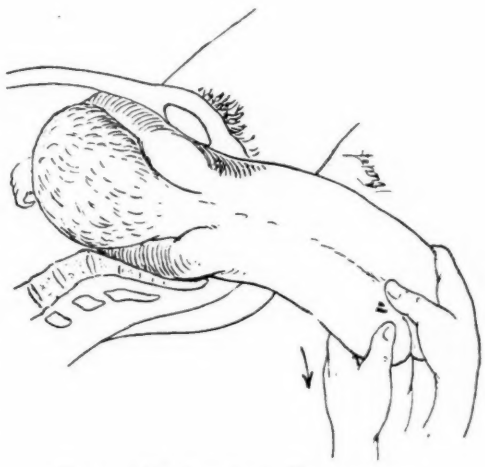

Fig. 1. Müller's method. First maneuver.

force. Traction must be exercised in the axis of the pelvis; that is to say, when the head is high the pull must be more downwards and when the head is low the pull must be more upwards. Undue traction on the lower jaw must be avoided. It must be remembered that the finger in the mouth is for the sole purpose of aiding flexion and not for the purpose of pulling out the head.

A type of this variety seldom used is that called the Prague method. This consists in grasping the shoulders with the fingers of one hand and the feet with the other, first sweeping the fœtal body well downwards between the mother's legs in order to flex the child's head and then, still maintaining traction, sweeping the body upwards and thus pulling the child out. This involves great strain upon the neck and heads have too often been pulled off. Besides, there is more danger of lacerations of the perineum than by the foregoing method. In my opinion, it is more efficacious.

Wigand, in 1820, introduced a method of expulsion of the after-coming head which has many advantages, especially in cases of contracted pelvis. Martin, in 1865, again introduced the method and added his name to it with a hyphen. The method consists in first attaining flexion by means of the finger exerting traction upon the lower jaw and then, while the finger within maintains flexion, exerting pressure from above through the abdominal wall and fundus in the axis of the plane of the pelvis in which the engaged diameter of the head lies. The finger of the left hand is usually employed for the flexion and the right hand for the external pressure. The method is very efficacious but runs

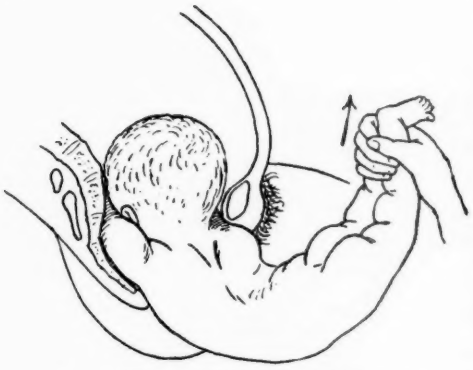

Fig. 2. Müller's method. Second maneuver.

some danger of injury to the mother's soft parts. It is important that pressure on the fundus should be made in the proper axis, otherwise much force is wasted against the sides or floor of the pelvis. The same principle obtains here as in the use of axis traction forceps; namely, that a much less force will attain results when applied in the proper axis than when otherwise applied.

The third variety of extraction of the after-coming head is by means of the forceps. Many obstetricians state that they seldom or never use this method, believing that they can extract any head by other means which can be extracted by the forceps. They also claim that it is a difficult method. Of course, the forceps cannot be applied until the arms are freed from the pelvic canal and that means that the head is then well down in the pelvis, at least well through the superior strait. The body of the child, seized by an assistant, is held forward as far as possible over the mother's abdomen and the arms are held out of the way. If this is done, it is really not difficult to apply the instrument, as I can testify from experience. The head lies with the occipito-mental diameter in the axis of the canal and the chin the lowest point. The blades are applied in the usual order in relation to the sides of the head as well as the pelvis. Typically, they will lie over the ears, just as when applied to a forecoming head, except that the head is reversed. The very traction on the forceps tends to increase the flexion and, if pulling is done in the axis of the pelvis, extraction is not hard. Personally, I first use the Mauriceau method. Failing in that with what I consider the justifiable amount of force, I at once turn to my forceps which, in all breech or version cases, I always have ready for use at my side.

So far we have considered only the management of normal breech cases. There remain to mention cases where, on account of some proper obstetrical indication of danger to mother or child, interference shall become necessary or advisable before the shoulders appear at the vulva. Such indications for haste are practically the same as those for forceps. The sooner they are needed, the more difficult is the procedure and the stricter should be the indications. When the breech is already engaged, it is usually too late to reach a foot and bring it down to pull upon. In that event we must rely upon some method of seizing the child in the region of the breech and exerting traction. There is a period, from the engagement of the breech until it has come about half-way down the pelvis, when this is extremely difficult and all sorts of expedients have been recommended.

If the child is known to be dead or if the indication on the side of the mother is grave enough to justify us in disregarding the child, the blunt hook or the cranioclast may be employed. Most modern authorities condemn the blunt hook as a tractor when the child is alive. The danger of severe lacerations at the groin is too great. If the cranioclast is to be used, one blade thereof should be passed into the rectum and the other laid over the sacrum. A difficult method but one not so dangerous to the child as the blunt hook, is that of the fillet. A broad tape or a strip of surgical gauze is passed through the fold between thigh and groin of the side anterior. Various carriers have been invented for carrying this fillet but all are open to criticism and none of them are likely to be in the bag when wanted. The stiff gum catheter, with stylet bent so as to be passed into the groin and armed with a thread to catch the fillet, is more feasible. It is very hard, however, to pass such a carrier and to get the fillet into it and then around the groin. Usually, the hand in the vagina will enable the fingers to push the fillet around the groin. After the fillet is passed or if the blunt hook is used, traction must be made in the proper axis. The pull will have to be far downwards, almost in a line with the anus. Thus the traction is at the best mechanical advantage in regard to the pelvic curve but also it is more nearly in the line of the axis of the child's body. If too much forwards, the pull is largely against the pubes and the pull is more against the thigh, with resulting danger of fracture of the bone. With the fillet or the blunt hook the operator cannot tell how much force he is exercising in his traction or whether he is using an unjustifiable amount of force. In the majority of instances the bent finger will be sufficient, if employed with skill and with patience. The forefinger is passed into the

Fig. 3. Van Hoorns method.

fold of the anterior groin and hooked. If the breech is high, the whole hand must often be passed into the vagina, in order to accomplish this maneuver. There is little danger of using too much force with the hooked finger, because a pull which would be dangerous will unhook the finger. The difficulty is in keeping the finger hooked. The process is very fatiguing. Traction made in the axis of the canal with a little to-and-fro motion will usually gradually bring down the breech so that soon the finger of the other hand can be hooked into the posterior groin. Then a great advantage has been gained, for when this has been accomplished success is almost certain. By pulling as much as possible with the pains and exerting a pump-handle motion as in pulling a refractory cork, the breech can be gradually drawn down until it is possible to release a leg. It is of the greatest importance that an assistant all this time should exert compression upon the fundus. To the skill of this assistant will be due a large share of the honor of a successful outcome. An intelligent nurse or sensible layman can often be taught how to do this pressing but, where possible, professional assistance is eminently desirable in the conduct of breech cases.

The forceps have been frequently recommended to be applied to the breech, in order to exert traction when the presenting part is high and there are reasons for wishing to terminate labor speedily. Forceps made especially for the breech, like those of Miles, are now obsolete. No teacher or practitioner of any standing now recommends them. The ordinary obstetric forceps were recommended by Levret and still have a few friends to-day. The instrument is made to fit the head and cannot at all fit the pelvic end of the fœtus. The space between the distal ends of the blades is less than an inch. Therefore, when the forceps are locked, these ends must compress the part of the fœtal body between them. If applied to the trochanters, as recommended by some, the ends of the blades impinge strongly against the iliac crests and are very liable to fracture the bone. If applied against the sacrum and thighs, the spinal column and the lower abdomen are endangered. If the blades are held apart so as not to bring the ends so close together, they cannot get a strong enough grasp to permit of any force in traction. If force enough to be effective is employed, the blades will slip off and may tear maternal tissues.

When the head enters the pelvis with the face to the front, as may happen in neglected cases, the Mauriceau method is difficult. The pubes are in the way of the hand and finger attempting to pull down the lower jaw in order to get flexion of the head. If the head has come down well flexed and the chin has not been caught by the upper border of the pubes, simple traction on the shoulders, with pressure from above, will usually be enough.

When the head, owing to the arrest of the chin, has become extended, it is best to resort to Van Hoorn's manual method. This consists in grasping the feet and raising then over the mother's abdomen, all the while exerting forcible traction. The chin will remain at the pubes but the neck and the occiput following it will be pulled down into the lower part of the pelvis along the curve of the sacrum. Finally, the occiput will be born first, as in vertex presentations, followed by the parietals, anterior fontanel, forehead and face, passing over the perineum in the order named. It is not difficult to apply the forceps while the body is thus held away and deliver the head occiput first, as ordinarily.

The complication of contracted pelvis is a grave one with breech presentation. With flat pelves, where only the anteroposterior diameter is shortened, the gravity is less, because, although very likely the head may extend, yet it may enter the pelvis in the transverse diameter and be born without much difficulty. The justominor or equally contracted pelvis is the gravest complication with breech. The tendency to extend is very great and thus an unfavorable diameter of the head becomes engaged. Because of the danger of extension of the after-coming head in a justominor pelvis, podalic version is usually declared to be contraindicated in such a condition. Therefore, if one has made the diagnosis of justominor pelvis of any considerable extent, he would make much more strenuous efforts at external cephalic version at the beginning of labor. It is well known that forceps are much more likely to be successful than podalic version in cephalic presentations with generally contracted pelvis. It is in these generally contracted pelves of not high degree that the Wigand-Martin method is most useful.

A NEW HYDRODYNAMIC BAG CERVICAL DILATOR

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At the October meeting of the Medical Society of the County of Kings, 1904, and at the March meeting of the Brooklyn Gynecological Society, 1906, the writer made preliminary reports in regard to a new form of hydrodynamic bag for effecting a rapid dilatation of the cervix uteri during the later months of pregnancy or at term. These reports were not published, as it was believed that improvements in the form, size, and construction of the apparatus were yet to be developed, as well as experience in the technique of its use. He now thinks that sufficient progress has been made to justify publication of the apparatus in its present form.

The field for an efficient, rapid, and safe method of shortening the first stage of labor is a very large one. Premature rupture of the membranes, placenta prævia, accidental hemorrhage, prolapsus funis, abnormal presentations, as well as the appalling conditions occurring in eclampsia, are titles suggesting difficulties which can be overcome by the established resources for the reasonably safe and rapid management of the stage of actual delivery —if only a rigid and undilated cervix did not block our way.

The accepted methods for rapid dilatation of the cervix at or near term may be classified thus:

1. Metallic graduated or branched dilators.
2. Inflatable rubber bags.
3. Manual methods.

The first class may be said to have reached its acme of efficiency in the four-branched dilator of Bossi, which is mechanically able to do the work called for, but which is considered harsh and dangerous in ordinary hands.

The most satisfactory inflation-bag in use at present is the Voorhees modification of the Champetier de Ribes balloon, employed in a series of four graded sizes. This apparatus provides, undoubtedly, a successful and safe means of dilating the cervix by substituting a nearly solid tapering cone for the inefficient or lacking amniotic sac, and a small amount of active dilating power can be applied by making traction on the stem. The bag itself, however, has no positive dilating effect. Its action is very slow, and will not fulfill the requirements of a reasonably rapid dilatation.

Manual dilatation as systematized by Harris and Edgar is at present the most reliable method for a rapid dilatation; yet the process may occupy a period varying from half an hour to two hours, usually a most exhausting affair for the operator.

The situation may be summarized in a quotation from J. Whitridge Williams's recent publication, *Obstetrics*, in which he says: "Various instruments have been devised to effect the rapid and complete dilatation of the cervical canal, but none of these are as satisfactory as manual dilatation."

It is the writer's belief that he presents a new

form of hydrodynamic bag that provides a uniform dilating force applied at the actual zone of resistance, and that it is at least equivalent in safety and efficiency to manual dilatation, without the fatiguing effects of that procedure on the operator.

The apparatus may be described as consisting of two bags, or compartments, combined. The upper or "anchor" compartment is inflatable by a tube which passes through the lower. The upper compartment, when distended, lies above the point of constriction of the cervix, anchors the apparatus, and measures the degree of dilatation at which the apparatus will slip out. The direct dilating effect is produced by gradual inflation of the lower compartment. The inevitable mechanical efficiency is satisfactorily shown in the accompanying illustrations. The smaller or preliminary apparatus (shown in Fig. 1) can be introduced through a cervix admitting one finger. The larger (Figs. 2 and 3) can be introduced as soon as the small size has done its work and is expelled. The small apparatus is straight, the large one has a pelvic curve, and is conformed in dimensions to the size and shape of the normally distended birth-canal.

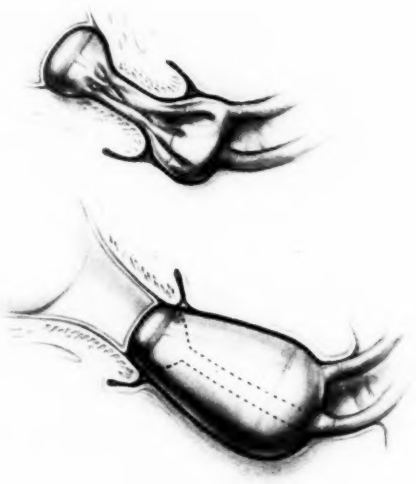


Fig. 1.

These double-compartment dilators have been used by the writer with encouraging results in eight cases of eclampsia and in one of placenta prævia centralis. Much experimental work has also been done in normal cases in the course of development of the apparatus. Only one accident has occurred. This was with a large-size bag used in a seven months' primipara, an eclampsia case. At this time the small-size dilator had not yet arrived from the manufacturer's, and the curved lower compartment had not yet been devised. This case was seen in consultation. The attending physician was endeavoring to do a manual dilatation, under anæsthesia, of a long and very dense cervix. After an hour's struggle we effected manual dilatation to three fingers and introduced a large-size straight-axis dilator (the only form in existence at that time).

The vaginal portion of the cervix had already been anteriorly torn by the pulling through of a tenaculum. Great care was exercised not to dilate the lower compartment too rapidly, but it was particularly noted that the lower compartment remained drawn high up in the vagina and showed no tendency to emerge from the vulva, as in cases heretofore. A full half-hour was occupied in distending the bag, when podalic version and extraction were performed. Examination after delivery, however, showed a large rent through the anterior lip of the cervix and through the vagina into the bladder. It was evident that the long cervix and undeveloped lower uterine segment had held the dilator so high in the vagina that the expansion without corresponding descent of the apparatus had extended the tenaculum tear in the cervix to a disastrous extent.

This patient, happy to relate, recovered from the eclampsia without sepsis, and the vesicovaginal fistula was subsequently successfully repaired.

It was this case that demonstrated the necessity of constructing the large dilator with a pelvic curve corresponding to that of the birth-canal, and of sufficient length to insure emergence from the vulva.

It is believed that the accident described above is not liable to occur with the present form of large dilator. It is not claimed that the apparatus is automatic or fool-proof. It is necessary to use both brains and skill in the management of the mechanical problems of child-birth.

The general technique for the use of these dilators is, as thus far developed, as follows:

Patient in dorsal position, under anæsthetic—preferably chloroform—at first to surgical degree; full preparation for aseptic conduct of operation (vulva clipped or shaved); dilators boiled five minutes in water, without soda. If the cervix does not readily admit one finger above the internal os, it is dilated to that extent by the finger, or by a broad-bladed metal dilator. The use of tenacula should be avoided if possible, as the softened cervix is easily torn. A perineal retractor may be employed, but it is not essential. To avoid invol-

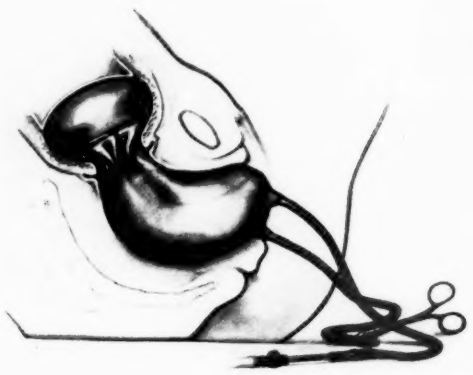


Fig. 2.

untary straining on the part of the patient, and consequent tension of the amniotic sac, and risk of rupture thereof, the patient should be fully anæsthetized at the time of insertion of either the metallic or bag dilators.

The small rubber dilator is rolled up and seized by a pair of special forceps, such as are on the market for use with the Champetier de Ribes balloon. The seizure is made so that a considerable portion of the upper compartment projects beyond the tip of the blades. A sterile liquid soap is used as a lubricant. When the upper portion of the apparatus is judged to be above the highest point of constriction of the cervix or lower uterine segment, the forceps are unlocked. By means of a large piston-syringe or an ordinary Davidson syringe carefully manipulated to avoid injection of air, the upper compartment is inflated with sterile water through its special tube, and that tube clamped. It is quite easy to tell that the compartment is full by the sense of resistance against the syringe-pressure. The forceps are then removed, each blade separately. The collapsed end of the lower compartment can be felt in the vagina, projecting from the cervix, and traction thereon will show the upper compartment anchored within the uterus. The lower compartment is now gradually distended by successive injections of small quantities of water, the tube to that compartment being clamped in the interval, occasionally all the fluid being allowed to escape to enable examination of the progress of dilatation. The rapidity of the dilating process is entirely under the control of the operator. Ten to twenty minutes is usually not too rapid to involve risk, except in the case of an undeveloped cervix of a primipara before term. When the dilatation is complete to a diameter of two inches, the entire bag slips out into the vagina and is removed. The large dilator is now introduced in a similar manner, care being taken to keep the concavity of the lower compartment toward the symphysis. After the upper compartment is inflated, about an ounce of the contained fluid is allowed to escape from the tube in order to soften the otherwise tense upper compartment. While the lower compartment is being gradually filled, the patient should be allowed to come partially out of the anæsthetic. As the vagina is distended and the cervical canal made tense with each injection of additional fluid, it will be noted that the patient makes efforts to expel the apparatus, thereby adding to the obliterating effect of the upper compartment by actually pulling it down through the cervix. The fluid may be allowed to escape from the lower compartment from time to time, and the progress of the dilatation examined. The time occupied in the final operation varies in the judgment of the operator. From twenty minutes to three quarters of an hour may be considered the range, depending on the condition of the cervix and the distensibility of the vagina. When the large dilator is finally expelled, it will be found that the birth-canal is fully prepared for version and extraction of a full-size fœtus. Exceptionally, in the conditions present at the seventh or eighth month of pregnancy, the lower uterine segment will retract, and it may be necessary to repeat the use of the dilator. It is possible that a special form and size of this dilator may be found necessary for exceptional cases, but it is believed that the two sizes here depicted will usually be sufficient. These dilators may be obtained from R. S. Guildford, 35 Bond Street, Brooklyn, New York.

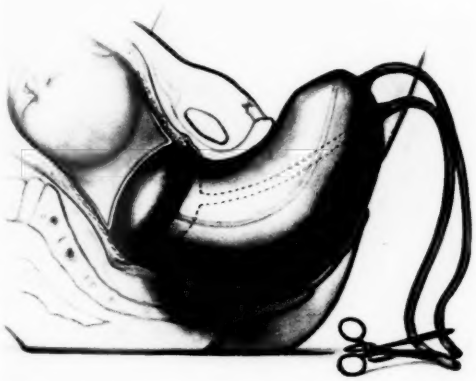
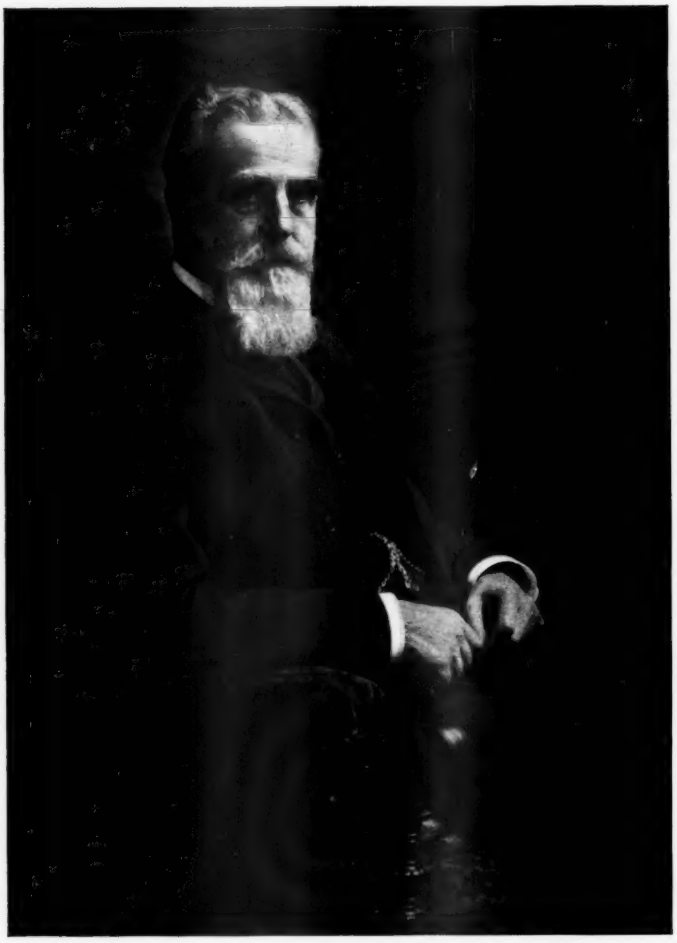


Fig. 3.



HOFRATH R. v. MOSETIG–MOORHOF

DEPARTMENT

NICHOLAS SENN FESTSCHRIFT

THE ELIMINATION OF CAVITIES IN OPERATIVE WOUNDS

CONTRIBUTED BY DR. R. VON MOSETIG-MOORHOFF
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TRANSLATED BY E. C. RIEBEL, M.D., CHICAGO

EVERY surgeon knows how important a part cavities remaining in operative wounds play in the process of healing. It is well known that their occurrence prevents primary union or retards any form of union, inasmuch as suppuration follows, as a rule. Hence the constant desire of surgeons to eliminate cavities, to drain the same, or resort to open treatment without closure of the wound.

Bone cavities the result of operations for removal of diseased osseous foci are to be considered first. The relative frequency of such operations explains the endeavors of many surgeons for obtaining ways and means of abolishing the resulting cavities by filling.

The material recommended for the filling of bone differs greatly, and many varieties are noted in the literature of the last twenty years. The material may be grouped under two main heads: 1. In absorbable substances; and 2. In non-absorbable substances. The latter are to remain permanently within the organisim; the former but temporarily, because they are removed partially or wholly in course of time by vital phenomena, to be replaced by a permanent organized cellular filling. Hence they serve as temporary substitutes only. This variety only shall be discussed in this article.

For purposes of better orientation it seems advisable to divide this provisional filling into: (*a*) Autoplastic material; and (*b*) Heteroplastic material. Among the autoplastic we mention blood, skin, and muscular tissue. Schede recommends a procedure under the title "Healing under Aseptic Clot," consisting of spontaneous filling of the cavity with the blood of the patient, followed by suture and occlusive dressing. The reasons for abandoning this method are, I believe, generally known. In the first place, we may not always succeed in determining the amount of blood required to fill the cavity and to prevent hemorrhage due to insufficient hæmostasis; secondly, it cannot be denied that the cruor serving as a filling furnishes a splendid medium for microbes possibly present despite all antisepsis. A. F. Schulten recommended pedunculated muscular flaps to fill the cloaca after necrotomy

of the femur, without finding any followers. Implantation of cutaneous flaps, according to Neuber, is suitable in but few cases; not to mention that this plastic operation, diminishing the size of the cavity without abolishing it, results, at best, in a reduction of the time of repair; for the remainder of the cavity will suppurate with the production of ugly, deeply retracted scars. This, then, is not filling, in our sense of the word.

As to heteroplastic filling material, McEwen and Poucet thought first of filling bony cavities with pieces of fresh bones of young animals. The idea found no consideration, especially as the material is not always easily obtained. Nicholas Senn, in 1889, gave a method remedying this difficulty. He published in the *American Journal of Medical Sciences* the following procedure: The tibia of a sound, newly killed steer is cut into pieces, decalcified with hydrochloric acid, and reduced to small thin slices, to be preserved in sublimate alcohol and kept on hand for immediate use. Before using, the corresponding amount is taken from the jar, rinsed with sterile water, and dusted over with a liberal amount of iodoform powder. At the closure of the operation, which is conducted under artificial anæmia, the bony cavity is washed with a corrosive sublimate solution, dried, and its walls powdered over with iodoform. This cavity is filled completely with the required quantity of "iodoformized" bone chips. Suture of the soft parts, application of an exact protective dressing, and removal of the constrictor conclude the operation. The first change of dressing should, if possible, not take place before two weeks. Union must be by primary intention. Occurrence of fever demands, of course, immediate change of dressings, release by removal of sutures, and eventually removal of filling. It was to be expected that this method, so well planned, would prove successful, under the master hand of the ingenious Senn, at least. Despite all, this was not the case, as a rule. Most frequently the filling was not tolerated, compelling complete removal on account of local septic symptoms or opening of wound, leaving the evacuation to subsequent suppuration.

What caused these failures? Indeed, not the hand of the operator, who is so pre-eminently a master of technique; hardly the material, which is absorbable, and was certainly antiseptic. Several failures and repeated thought have, I believe, led me to find the true cause. It lies in the fact that the filling does not close the cavity hermetically, no matter how densely and carefully packed. Between the filling and the cavity wall, as well as between the small decalcified bone slices, small spaces may exist, including minima of air, together with a greater or less number of microbes, always present here to a greater or less degree: *exinde suppuratio*. Gradually I arrived at the conclusion that the organism would tolerate only a complete hermetic closure of an aseptic cavity with an antiseptic filling. A hermetic filling can, however, be accomplished only by a mass which can be poured in liquid form into the dry bone cavity, which there solidifies. Since I came to know this, and have found suitable filling material, I have not experienced any further disappoint-

ments, and have within five years treated far more than a thousand cases. The filling (plombe) was always well tolerated. Experiments with soft pastes of various composition gave unsatisfactory results, due to the above-mentioned cause.

The filling mixture which at present I employ exclusively consists of iodoform, spermaceti (cetaceum), and sesamoil; I call it iodoform-plombe, and, furthermore, temporary, as it does not permanently remain within the organism. This fact has caused critics to take exception to the term "plombe." I, however, retain the term, which appears to me more convenient than its equivalent, "filling-mass."

The method of preparation of the iodoform-plombe is as follows: Strict asepsis of materials, vessels, and hands; equal parts of spermaceti and sesam-oil are melted in an evaporating-dish, then filtered into a florentine flask and sterilized in a water-bath; forty grams of finely powdered iodoform (not crystallized) are put into a sterile flask, and sixty grams of the hot, fat mixture are added, under constant agitation. This agitation must be continued without interruption until the mass solidifies. The melting-point of the plombe is between 45° and 48° Celsius. The necessity of constant agitation makes it unnecessary to fill the flask; but one fourth of its volume should be left free. The flask is closed with a sterile rubber stopper. Danger of decomposition of iodoform prevents exposure to a higher temperature. The proportion of iodoform to the two other ingredients is forty to sixty. The proportion of iodoform may be varied, of course; but the present formula, however, has proved best. Solidified, the plombe represents a yellow, firm, brittle mass, in which, when carelessly prepared, the heavier iodoform powder lies at the bottom, while the solidified fat mass is above. Before using, the plombe is to be heated in a water-bath or suitable thermophor to a little above 50° C.; a higher temperature than 55° is not advisable — first as regards the iodoform, and then to prevent the emulsion from becoming too liquid, thus retarding its cooling to below 50° C., i.e., solidification, leading to unnecessary prolongation of the operation. Artificial promotion of rapid solidification by ice-bags or ether-spray is neither necessary nor useful. We wait patiently for a few minutes until the plombe has solidified up to its surface, then proceed to suture the soft parts, apply an occlusive dressing, and finally remove the constrictor. The flask, after removal from water-bath at 55° C., should, of course, be again well shaken until poured out; for it is an emulsion. The emulsion has always been poured directly from the flask; it is easiest, most convenient, and serves the purpose completely.

A corresponding preparation of the bone cavity is required before receiving the plombe. All diseased tissue is to be removed in a most painstaking and exact manner; the wall is to be cleaned thoroughly by gouge, sharp spoon, fraise, etc. The removal of the presenting wall of the cloaca takes place by angular or straight bone-chisel, or by means of small electric rotatory saws. Everything is removed down into sound bone. Only a

complete new formation of the wall of the cavity guarantees asepsis. Irrigation with antiseptic solutions is not reliable. This, likewise, may be said of cauterization. However, irrigation may precede the filling, to wash away bone splinters or bone-dust when a rotatory fraise has been used; a one-per-cent solution of formaline is recommended for this purpose. The operation is to be performed under artificial anæmia, if practicable. The field of operation should be rendered accessible to the sight as well as to the hand; in consequence, we recommend the formation of a flap from the soft parts and that the bone be exposed to a sufficient extent. It is understood that the periosteum must be kept attached to the flap of soft parts. The form of the cavity to be filled is of little consequence, as the semi-solid filling penetrates everywhere; care must be taken, however, to observe the laws of gravity in filling; i. e., the extremity is to be placed in a corresponding position. In a femur, for example, with a large cavity it is advisable to fill in several steps; namely, the central portion first with high elevation, and rotation of the leg after cooling of the mass, in this place lowering of leg and filling of distal portion; finally, after solidification of the plombe above and below, conclusion of the process by filling at the center until cavity is obliterated.

Not only should the cavity possess freshened aseptic walls before receiving the filling, but it should likewise be dry; for the least amount of moisture prevents a hermetic apposition of the mass, its penetration into every groove, fissure, and the termination of the Haversian canals, thus endangering the result. The presence of blood is to be considered first. Despite application of a constrictor, it occasionally happens that a few drops of blood ooze from the walls constantly, although removed by sterile dry sponges. Moistening the sponges with adrenalin does not always suppress this annoying oozing. In such cases, in order to save time, I usually pour the filling out in such a manner as to have it run along one side of the wall; the plombe (owing to greater specific gravity) floats the drops of blood and closes the source of oozing by penetrating into the crevice. At the close, single drops of blood may be observed upon the surface of the plombe, which are easily sponged away after solidification. Conditions are more difficult when one is compelled to operate without artificial anæmia; as, for instance, in resection of the hip or of the humerus, and also in cleaning out a marrow cavity high up. Circumstances here prohibit the application of a constrictor. Much patience is required in these cases; peroxide of hydrogen and adrenalin may be employed. Hemorrhage from severed vessels of the soft parts is controlled by ligation and suture ligature. This is to be done, if possible, before the constrictor is removed; if more voluminous soft parts have been cut, however, hæmostasis after removal of constriction is advisable — of course, at termination of filling. This is covered provisionally by a piece of rubber tissue and a sterile sponge. These are removed after complete hæmostasis of the soft parts, and the latter sutured. Proceeding in this way, I have never experienced a late hemorrhage. Short drains are employed only in joint resections, not

elsewhere. The fistulous tracts that oftentimes exist suffice, as a rule, to drain the small amount of serous secretion from the soft parts. These tracts have to be curetted carefully. At times, placing of sutures at greater intervals insures ample drainage.

After necrotomies the drying out of the remaining cavity, not only with sponges, but also by insufflation of hot or cold air until the walls lose their moist luster, is to be highly recommended. The hermetic adhesion of the filling is thereby insured. In employing the plombe as a filling for defects after joint resection, where the walls are not formed by osseous substance alone, I have always found gauze pledgets sufficient to dry out the cavity.

The dressing should be applied as a permanent one. No compression should exist. Iodoform-gauze next to the skin is neither necessary nor advisable, especially not in children or in persons with tender skins. The appearance of eczema as a consequence of iodoform application to the skin of some patients is sufficiently known. The dressing should not be air-tight, to prevent maceration of the epidermis. Dressings applied in the vicinity of the natural openings of the body may be covered with a piece of batiste to prevent soiling by urine, fæces, or wound secretions. The change of dressings should not be frequent, except when demanded by septic symptoms.

The course of healing after iodoform filling is aseptic, as a rule. Sometimes the temperature rises within the first two or three days — so-called aseptic fever — which yields to a cathartic. I never employ plaster of Paris as a supportive dressing after joint resections; I rather apply wet organtine bandages and lathing over the permanent dressing, augmented eventually by a wooden gutter-splint.

The filling of cavities without freshening up, at a late stage in the after-treatment, when granulations have formed, is not advisable, because complete asepsis cannot be supposed to be present. Filling should be done primarily, or not at all.

The amount of filling employed in a given case is of no consequence, as the possibility of intoxication is entirely excluded. Intoxication may occasionally occur in persons with no previously known idiosyncrasy, after application of iodoform powder or liquid emulsions, because absorption of large quantities of iodoform by the lymphatics is possible. The iodoform-plombe, however, consists of a solidifying emulsion, influenced only by the granulations, and these are produced, but slowly and gradually; hence rapid introduction of large amounts of iodofrom into the circulation is impossible. The disposition of the sprouting granulations toward the solidified plombe varies between complete closure of the wound and healing by primary intention and incomplete closure. In the first case, absorption of the plombe is effected through the steadily advancing granulations by vital phenomena; in the second, we have partial displacement and expulsion. This ejection through the wound, or through previously existing fistulæ enlarged by curetting, always takes place without suppuration, without fever, with a

minimum of lympho-mucous secretion from the soft parts, but never from the filled bone cavity. Mechanical removal of the plombe, gradually pushing through the opening by sound, spoon, or forcible irrigation, is to be avoided. Clean the skin superficially, apply a fresh dressing, thus following Lister's teaching, "Let the wound alone." Expulsion of the plombe with symptoms of local sepsis — i. e., suppuration and rise of temperature — I have never observed. Its occurrence is hardly due to the filling; rather to insufficient asepsis or faulty technique. The method is not at fault, but the operator. In case of complete closure of the wound, the filling is not expelled, but absorbed by granulation: *Ôte toi, que je m'y mette.* The gradual slow disappearance of the plombe can be observed and proven by the radioscope; one is always in a position to watch the course of restitution of the bone defect by organized substance which eventually assumes osteoid character. After organic cicatrization of the defect no shadow can be seen in the radiograph. The amount of time required by nature to fill the defect with osteoid substance varies, of course, and depends upon the character of the bony walls — if sclerotic, porous, or normal — and also upon the size of the cavity. This question is of minor importance to the patient at the termination of or during cicatrization, for he may enjoy life without continuous surgical surveillance. It has been proven a thousand times or more on the living that the plombe is merely a provisional substitute destined to prevent suppuration and its consequences. The X-ray shows the course of the process of healing. Silbermark has brought histological proof by animal experiments. The final result remains the same: whether the plombe is absorbed by granulations or forced out through openings in the wound, it always serves as framework for the organized bone substitute. I have tried other antiseptics in place of iodoform (preparation and composition of filling remaining the same otherwise), especially on account of its odor. I have, however, penitently returned to the use of iodoform. As an antiseptic, at least, iodoform is at present unsurpassed; it also stimulates granulation, and prevents, in tubercular bone affections at least, local recurrence; it also has a favorable influence upon the general constitution. The patients thrive, existing pulmonary affections remain stationary; much reduced children, especially, pick up remarkably. It cannot be absolutely denied that the introduction into the organism of, I might say, homœopathic doses of iodoform has its share in this. A deleterious action of the iodoform is at least not to be apprehended. Fears of the results of iodoform, occasionally expressed, are certainly unfounded, especially if it is taken *cum grano salis*. The urine, of course, always contains a small amount of iodine. I am of the opinion that this acts favorably upon an existing amyloidosis of the kidney which is caused by the prolonged suppuration previous to operation.

I have employed the iodoform-plombe in all forms of osteomyelitis with a chronic course; in osteom: necrotica, osteom: granulans, which is so painful, also in bone abscess, and in the so frequent tubercular form and fungus

articuli. Only in the acute, infectious form of osteomyelitis — the so-called "typhoid of the extremities" — is it contraindicated, because in these cases the process is still progressive. Hence a complete asepsis of the curetted medullary cavity is not to be obtained, in the grave cases at least. The cavities resulting from arthrectomies and joint resections I likewise fill, in order to avoid suppuration. The cicatrix replacing the filling thus becomes firmer and more solid than usual; flail-joints never follow. In general, I believe that the iodoform-plombe can be used to advantage in all cases in which the elimination of a cavity (not otherwise obtainable) is desired.

The use of the iodoform-plombe in tuberculosis of the extremities, especially in joint tuberculosis of synovial-osseous character, will prevent a great deal of mutilation and loss. Careful removal of the fungoid capsule of the joint and isolated excochleation of carious bone foci will yield useful members. The operative treatment of fungus articuli becomes thus possible, in children even, because we are able to preserve the epiphyseal cartilage so indispensable for further growth. An exception is furnished by coxitis, because here the disease itself usually destroys the epiphyseal cartilage, owing to its close proximity to the head of the femur; similar conditions may be observed in cases of the shoulder-joint. The operator may not replace that which already is destroyed; he may, however, in many cases, prevent destruction by the disease by his timely interference. The disadvantages of the conservative or so-called expectant treatment in tuberculous joint disease should, however, be mentioned. Not so very infrequently the operator is placed in the position to state at the autopsy that the term "conservation" applies less to extremities and organism than to preservation and furtherance of the pathological process. The "vis medicatrix naturæ" has its limits, and requires active support. Often enough, radical removal of infectious foci is imperative.

In closing, I summarize as follows:

1. Elimination of so-called "dead spaces" in operative wounds is always to be aimed at, to prevent suppuration and its sequelæ, as well as to promote more rapid healing.

2. It is appropriate to use hermetic filling of these spaces, if other methods cannot be employed.

3. Conditions for filling (plombing) are as follows:

(*a*) *As to the Cavity.* Removal of all diseased tissue, new formation of the cavity by ablation down into sound tissue, to produce aseptic conditions and render cavity dry.

(*b*) *As to the Filling.* Preparation under aseptic precautions; the filling must be prepared with a permanent antiseptic, as its most important constituent. The mass should be poured into the cavity when liquid, and should solidify there to effect a hermetic closure.

4. The iodoform-plombe is merely a substitute; a locum-tenens remaining in the cavity until either entirely absorbed by granulations, or partially absorbed and partially expelled.

5. Absorption or displacement take place but slowly and gradually, proportionate to the production of the granulations, which serve as permanent organized filling. This gradual disappearance of the plombe keeping step with the progress of cicatrization may be observed radiographically.

6. Iodoform intoxication is not to be feared, owing to its extremely slow absorption and introduction into the general circulation, even in large cavities and with a correspondingly large amount of filling material.

7. The course of healing after use of iodoform-plombe.is, with correct technique, always aseptic. With complete closure of the wound, healing prima intentione is the rule. The final results are the best possible, also, from a cosmetic point of view, because deeply retracted scars do not result, owing to the active organized substitute.

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PRIMARY CARCINOMA OF THE APPENDIX

Appendicitis, with its well-known recurrent attacks and tendency toward chronicity, would be followed, one might suppose, by carcinoma of the appendix more frequently, to judge by the numerous instances in which such malignant tumors are held to occur as sequelæ of chronic inflammation in other parts of the body. Yet primary carcinoma of the appendix is considered a rare disease, its existence having attained somewhat of a general recognition only within recent years. The reasons for this are doubtless numerous. One of the most obvious is the difficulty of determining the starting-point of carcinoma of the cæcum. It is not unlikely that many carcinomas of the cæcum have their origin at the junction of the two canals — cæcum and appendix — or at times just within the mouth of the appendix, reasoning again by analogy with well-known facts concerning carcinoma at other points in membranous channels. Such tumors, however, are not classified as primarily appendiceal; an origin from positions more distal is necessary to satisfy the strictly critical observer that the growth originated in the appendix.

The greater frequency of microscopical examinations of removed appendices and certain studies of the methods of growth of tumors are other factors accounting for the discovery of practically all the authentic cases within the last ten years.

The cases are so few, and the encountering by any one observer of but a single case is so generally the rule, that any clear understanding of the process seems impossible at present, notwithstanding the careful review and commendable attempt in this regard in the recent report by Rolleston and Jones.[1]

For example, it is rather startling to learn that secondary growths occurred in only five of the thirty-seven cases which they consider genuine; this is not at all in accord with what is known of carcinoma in other portions of the gastro-intestinal tract. This slight disposition to grow by metastasis may be apparent only, and due to the accidental discovery, during or after operations, or at post-mortem examinations, of many of the growths while they were yet small. It may also be due to the uncertainty, before mentioned, of ascertaining the primary point of origin of tumors which have attained greater size and produced metastatic growths.

It is likewise easy to believe that some of the reported cases are, in reality, simple reparative processes following inflammation in which proliferation of epithelial cells and imperfect repair have taken place without, as yet, extension to the lymph-paths.

Other surprising information, and directly connected with the foregoing consideration of

[1] *Am. Jour. Med. Sciences*, 1906, N. S., vol. cxxxi, p. 951.

an absence of metastatic growths, is contained in their discussion of a group of cases, which they refer to as "spheroidal-celled" carcinoma. Nearly one half of the cases of carcinoma were of this variety — 17 out of 37 — and the average age of the patients was 27.2 years; the youngest 12 years, the oldest 37. In the five cases of columnar-celled carcinoma, or, as it is often termed, adenocarcinoma, the form usually encountered in the alimentary canal between the cardia and anus, the age incidence, on the other hand, is what one would expect, viz., 52 years.

Rolleston and Jones comment quite extensively upon the benign characteristics of the "spheroidal-celled" form, and recognize the somewhat doubtful position this form occupies as true carcinomas. The increasing number of cases of primary carcinoma of the appendix found each year must lead to further studies; it is certainly not as rare as has been supposed. At present the disease has no place in clinical medicine, since it has never been recognized before operation or autopsy.

CARDIOSPASM

The wall of the œsophagus contains a layer of muscle fibers arranged in a circular and longitudinal direction. The total thickness of the œsophageal muscle varies from one half to two millimeters. Under normal conditions, the œsophagus contains a small amount of air, the pharyngeal and cardiac orifices being closed by a slight contraction of the muscle fibers at these points. During the act of swallowing food the pharyngeal and cardiac orifices are automatically relaxed, and the morsel is carried into the stomach by a slight peristaltic action of the œsophageal muscle.

For many years it has been recognized that difficulty in swallowing, and even obstruction to the passage of a bougie, could arise from spasmodic contraction of the muscle of the œsophagus. Until recently, however, it was generally understood that œsophageal obstruction thus occasioned was transient and not of a serious nature.

The work of Meltzer, Rumpel, Mikulicz, Rosenheim, and others has developed a more or less accurate knowledge of the condition, and we are now able to recognize a relatively new, and oftentimes extremely serious, clinical and anatomical picture, caused by spasm or heightened contraction of the lower orifice of the œsophagus. The condition is termed cardiospasm. Spasmodic contraction of the œsophageal muscle may take place at any point in the œsophagus. Serious difficulty in swallowing does not arise, however, except when the spasm is located at the pharyngeal or cardiac orifices. Spasm at the pharyngeal orifice seldom causes prolonged symptoms. Spasm at the cardiac orifice may likewise be transient. Not infrequently, however, the spasm is more persistent, causing obstruction and actual retention of food in the œsophagus.

Proportionate to the retention, dilatation of the œsophagus, fusiform in shape, arises, accompanied by compensatory hypertrophy of its muscle fibers. The capacity of the normal œsophagus is about 100 c.c. The capacity of the œsophagus dilated from cardiospasm varies, in the cases thus far reported, from 150 to 180 c.c. The usual capacity in a well-developed case varies from 250 to 500 c.c.

The clinical symptoms are definite, and should be readily recognized. The condition is more likely to develop in individuals of nervous temperament. The onset of symptoms may be sudden, following mental or physical shock, or some infectious disease, as pneumonia. In other cases the onset is gradual and without apparent cause.

Discomfort or actual pain, usually located behind the sternum, is likely to appear during meal-time. The patient is usually conscious

that food is arrested before it reaches the stomach. A sense of fullness is present. Extra effort is used to swallow the food. The patient learns to eat slowly. Upon attempting to eat rapidly, regurgitation is likely to take place. This is frequently mistaken for vomiting, but nausea is rarely present, and upon inspection typical œsophageal regurgitation should be recognized. The obstruction is rarely sufficient at first to interfere seriously with nutrition. The patient learns to force the food through the constricted area by crowding more food and liquids into the œsophagus, swallowing frequently, taking a deep breath, or throwing the shoulders back, or adopting some other movements, such as those used in rowing. Frequently it will be possible to aspirate from the œsophagus from 100 to 400 c.c. of liquid, containing food particles taken several hours before. An abundant quantity of glairy mucus is always present.

There may be little or no obstruction to the passage of a bougie. As a rule, however, the stomach-tube or bougie meets with a resistance at the cardiac orifice, which is usually overcome by slight pressure.

The symptoms of obstruction may subside for weeks or months at a time. After dilatation of the œsophagus develops, and becomes fixed in hypertrophy, the symptoms are likely to persist. Unless the condition is recognized and properly treated, sooner or later regurgitation of food becomes a constant symptom, and death from starvation is likely to occur.

In the mild cases, soft, non-irritating foods, sedatives, and physical and mental rest may be sufficient treatment. No doubt, many unrecognized cases recover without treatment. Forcible dilatation or overstretching of the cardiac orifice is recognized as the best method of overcoming the spasm. For this purpose bougies produce little permanent effect, because it is impossible to pass a bougie sufficiently large to produce actual stretching of the cardiac orifice. Cases in which the retention of food has resulted in œsophagitis are made worse by the passage of bougies.

Rosenheim and others have used rubber bags inflated with air or water to produce distention at the seat of spasm. These were more successful, in a measure, but not satisfactory, since the distended bag would dilate at the points of least resistance, i. e., into the stomach, or up into the dilated œsophagus, and the degree of pressure exerted at the seat of spasm was unmeasured.

Mikulicz opened the stomach and dilated the cardiac orifice from below by means of instruments. The success obtained by him in four cases has led other operators to follow his example.

The writer has constructed a rubber bag dilator, by means of which it is possible to accomplish any degree of dilatation desired, without the use of an anæsthetic. The degree of dilatation is accurately controlled by means of a cloth sack, which covers the rubber bag. Thus far, nine serious cases have been treated by the bag, with complete relief. The frequency with which the cases have been recognized during the past few years shows that the condition is not rare. Formerly the fatal cases were usually diagnosed carcinoma of the œsophagus. B. W. Sippy, M. D.

TRANSACTIONS OF SOCIETIES

WESTERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

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The President, DR. M. L. HARRIS of Chicago, in the chair.

TESTIMONY AND EVIDENCE IN MEDICINE

This was the title of the President's address. He deviated somewhat from the custom of his predecessors, in presenting some purely surgical subject for consideration, in order to take up a matter of a more abstract nature, yet one which he believed to be of the greatest practical importance, and one too often neglected by most physicians. He referred to the question of testimony and evidence in medicine.

The physician must recognize the possibility of error in the testimony of those who have every reason and intention to be honest. Therefore, in receiving knowledge of facts from the testimony of others, one should be influenced by their accordance with facts previously known or believed, and this constituted what was termed their probability; but in being influenced one must guard against two sources of error; namely, unbounded credulity and unyielding skepticism, for the former, he said, was the attribute of a weak mind, which seldom thinks or reasons, while the latter belonged to those who find nothing probable beyond their own limited field of observation and experience. That those things which accorded with one's own observations were more readily believed than those which did not, was quite natural, and thus the value of a wide experience became evident.

Testimony and evidence are by no means the same. There might be a great deal of testimony, yet very little evidence. By evidence is meant "the means by which any alleged matter of fact, the truth of which is submitted to investigation, is established or disproved." This is the legal definition, and indicates its origin by containing hidden within it a description of the method of procedure in law. A definition which conveyed a better idea of the meaning of evidence, as applied to medicine or the investigation of natural phenomena, is, that evidence is any fact which, when presented to the mind, effects, or tends to effect, a conviction concerning the existence of some other fact. This does not presuppose nor assume any certain conclusion, but leaves the conclusion to be that which the evidence warranted. The value of the evidence in establishing the facts as such in any particular case varies greatly.

Most of the testimony of patients is presumptive evidence, of the disputable variety, and while the presumption is usually that the statements made were true, this is by no means always the case. For instance, in the case of a young woman with suppression of menstruation and an enlarging abdomen, experience had shown that the incentive to mislead is so great that the presumption is entirely in favor of the testimony being false. Also, in that large class of personal injury cases in which monetary compensation is sought, a large experience involving thousands of cases has convinced the author beyond a doubt that much of the testimony in this class of cases is presumptively untrue, and that it can only be believed when substantiated by correlated facts. These conditions should be recognized by the physician, in order not to be misled by the statements which he receives from the patient.

Every diagnosis is, or should be, a conclusion based upon evidence; yet how often do we find, when the rules of logic are applied, that the diagnosis, instead of resting on evidence, rests on assumption and inference. This is due to the fact that the majority of physicians, in their ratiocinations, fail to distinguish between assumption, inference, and fact. An assumption is that which is taken for granted; that which is accepted as true without evidence; while in inference is the result of a ratiocination based upon a certain amount of evidence. The difference between an inference and a conclusion is, that the former is drawn from the appearance of things, is partial and indecisive, and pertains to particular circumstances, while a conclusion is drawn from real facts, is full, decisive, and conclusive, and expresses the necessary dependencies of the premises. The difference between an assumption, an inference, and a conclusion was clearly illustrated.

In medicine, he said, there are many hypotheses which are of the greatest value in enabling us to develop the facts, but when we come to the practical application of our knowledge to the individual case, or to the giving of testimony before courts and juries, we should learn to recognize and to distinguish the assumed, the inferred, and the hypotheses, so as to confine ourselves to the known facts and the warrantable conclusions derivable therefrom.

GASTRO-INTESTINAL ULCER

Dr. Harry D. Niles of Salt Lake City, Utah, in a paper on this subject, said it was highly probable that the most common primary lesion of the gastro-intestinal canal was ulcer. The relative frequency of ulcer in the stomach had been demonstrated, while the relative frequency of ulcer in the small and large intestines had not yet been actually demonstrated; but the assumption that it often existed unrecognized, and perhaps unsuspected, certainly seemed to be founded on good substantial grounds.

1. The anatomical structure of the intestine closely resembled that of the stomach, and naturally should be subjected to the same pathological changes in the presence of the same causative conditions. 2. The several causative factors of ulcer existed, and were as likely to prevail in certain portions of the intestines as in the stomach, with the exception of hyperacidity, and this, in a measure, was balanced by the fact that typhoid fever, dysentery, and some other specific causes of ulcer existed only in the intestines. 3. Primary cancer of the gastro-intestinal canal, which was a sure sign of an antecedent ulceration, was frequently found in the pouches, strictures, or angulated portions of the large intestines, as the rectum, the sigmoid, the cæcum, and the hepatic and splenic curvatures. 4. It was easy to understand how many chronic symptoms heretofore regarded as indications of purely functional disturbance could more reasonably be explained as coming from bowel ulcerations. Given, then, parts where the anatomical and physiological conditions were most favorable for the production of ulcer, and which were the favorite sites of intestinal cancer, which was known to be always preceded by ulcer, associated with symptoms that were most reasonably explained by attributing them to ulcer, we had strong reason for assuming the probable presence of ulcer, and that under such circumstances we were not often justified in making a diagnosis of functional disturbances and contenting ourselves with any empiric treatment.

In speaking of the causes of gastro-intestinal ulcer and of the symptoms, the author said that the most valuable aids in recognizing intestinal ulcer were:

1. A realizing sense of its probable frequency.

2. The chronicity of the abdominal symptoms or their frequent recurrence without apparent provocation.

3. The absence of the usual signs of an acute inflammatory lesion, such as fever, swelling, or tumor, acute pain, and tenderness.

4. The history of an old inflammatory lesion, typhoid fever, tuberculosis, and dysentery.

5. The exclusion of toxæmia and existing disease of other abdominal organs, more particularly the pancreas.

6. Any gaseous distention of the bowel, with or without colicky pains above the seat of the ulcer.

7. Watery stools, which are very suggestive when they exist, and obstinate constipation, which is more common but less suggestive.

8. The presence of pus or blood in the stools.

9. Signs and symptoms that may be elicited by inspection, palpation, or percussion before, during, and after inflation of the large intestine with air, or distention with water.

10. The various mild, acute, chronic, or recurrent obstructive symptoms that may occur when the ulcer leads to local paresis, or when an ulcer scar narrows the lumen of the bowel.

11. A fair consideration of the causes, complications, and sequelæ of ulcer.

12. All the signs and symptoms that accompany ulcer when perforation occurs.

The most common cause of gastric ulcer (a chemical irritant) might be detected by an examination of the stomach contents. The particular cause of an intestinal ulcer could usually be inferred by the history of the case. The most common noticeable symptom in both gastric and intestinal ulcer was dilatation above or near the site of the ulcer, and the discomfort it produced. In gastric ulcer, this discomfort was usually periodical, and severe vomiting relieved it. In intestinal ulcer, distress was more continuous and colicky in nature, and unless the occlusion of the bowel was complete, vomiting rarely occurred.

In gastric ulcer the presence of blood may be detected in the stomach contents; in intestinal ulcer we must resort to an examination of the fæces to prove the presence or absence of pus or blood. Obstructive dilatation above an intestinal or pyloric ulcer was easy to determine if proper means were employed.

In developing our knowledge of this lesion, he said, we must bear in mind that ulcer is not only a

producer of symptoms as a primary lesion, but as the antecedent pathology of many grave complications and sequelæ, it may indirectly cause a great variety of puzzling symptoms which one should strive to interpret correctly.

So long as in the consulting-room and at the bedside of patients physicians permitted themselves to think of gastro-intestinal ulcer simply as a theoretical possibility of rare occurrence and obscure pathology, the symptomatic treatment would preprevail, and unsatisfactory results would follow. As soon as we learned to appreciate that ulcer was not only a real pathological entity, but that it was the most common of all gastro-intestinal lesions, a producer of distressing symptoms, and a forerunner of dangerous complications, we should find ourselves very near the true explanation of many obscure chronic abdominal symptoms, and we should be prepared to formulate a timely and rational treatment for the pathology that produced these symptoms.

DISCUSSION

Dr. Andrew C. Smith of Portland, Oregon, said that gastro-intestinal ulcer was common. It was a pathological entity that should be considered in all conditions of chronic abdominal symptoms. Formerly, these cases were treated expectantly and continuously for long periods of time, physicians not realizing or knowing the true pathological condition. In the great majority of cases of chronic abdominal affections, gastro-intestinal ulcer was and should be considered the prime lesion.

Dr. W. W. Grant of Denver, Colorado, stated that gastro-enterostomy for ulceration of the stomach and intestine, particularly the duodenum, and for obstructive lesions of those parts, was now one of the most common and conservative of modern operations. Like most new surgical triumphs, however, it was likely to be somewhat abused before it reached its proper status as a surgical procedure. Surgeons should be a little more conservative in the surgical treatment of these conditions, and not until there were manifest evidences of ulcer, not necessarily acute hemorrhage, but persistent ulceration and obstruction, was it desirable to perform this operation. A large number of these cases were attended with a profuse acute hemorrhage. These were the chronic digestive cases, in many of which the hemorrhage was not manifested; but the investigations of Rosenthal and Frederick had shown that in these there was what is known as occult hemorrhage. This was shown chiefly by microscopical examination of the contents of the stomach and of the fæcal discharges. When this condition existed and persisted, operation was demanded. Operation, however, should not be undertaken until medical treatment and other non-surgical measures had had a reasonable trial.

Dr. B. B. Davis of Omaha, Nebraska, said that in a number of instances of ulcer of the stomach, duodenum, and in the region of the pylorus, he had been able to get a definite idea as to the existence and site of the ulcer by distending the stomach with air, whereas before this he was absolutely at sea. Whenever there was suspicion of ulcer, either of the stomach, the duodenum, or intestinal tract lower down, the physician could resort to systematic daily examinations of the stools for blood. In a number of instances he had been able to make a diagnosis in this way, whereas if one resorted simply to gross inspection he never would suspect the existence of ulcer.

Dr. John C. Morfit of St. Louis, Missouri, said there was nothing that he admired more than radical conservatism. He liked to see a man who could use his head without using the knife, but who never used the knife without using his head. The greatest point connected with gastro-intestinal ulcer was, not the operation itself, but the diagnosis. Gastro-enterostomy had been so developed and perfected that it was now a comparatively simple procedure, and for that reason some men with surgical tendencies might operate sometimes because they could, and not because they should, do so. He would hesitate to operate on a case of gastric ulcer until the patient had been seen by both a good internist and a good neurologist, on account of the possibility of hysteria and neurasthenia being connected with the case.

A case in point. Just before leaving St. Louis to attend the meeting, he saw a woman upon whom a gastro-enterostomy had been performed, with temporary relief of all symptoms, and then a recurrence. A second gastro-enterostomy was done, followed by transient relief and then by a return of all the symptoms. She was very much emaciated, so that the members of her family thought she would certainly die. She fell into the hands of a broad-minded neurologist, one with surgical knowledge and experience gleaned from careful observation. This man proved beyond a doubt that her condition was purely psychic. He gave no drugs. He advised no operation. He gave good, earnest, moral psychic treatment, and the woman recovered. This case went down as a mark against surgery, as a triumph of neurology. Eighteen months ago he had a case in his service in the St. Louis Hospital, and had observed the man for weeks, examining him carefully, and also had other men see him. These men were good

internists, and the final conclusion was that there was an ulcer somewhere low down in the bowel. There was bleeding and painful stools. An exploratory operation was advised, and curative, if possible. The man refused it, and passed from under the speaker's observation for eighteen months. When he saw him at one time in the middle of the night, he found him with the map of intestinal stricture on his abdomen. With his knowledge of the previous examination and experience with this case, he had no doubt of the condition of stricture or obstruction following ulceration. The man had been in the hands of an ignorant irregular practitioner, who had treated his symptoms without having any idea of the condition, and had given him morphine and purgatives for six or eight days. When the speaker saw him he was in shock. After stimulation and getting the patient to the hospital, his abdomen was opened, and, he said, it was just like taking a baseball out of the pelvis. The sigmoid was resected. There was in the sigmoid an adenocarcinoma as large as a fist. The purgative treatment did nothing but aggravate the symptoms. The man died, not from the operation, but from the delay of ignorance.

Dr. E. F. Root of Salt Lake City, Utah, said it ought to be pointed out to the general practitioner that ulceration of the bowel was very much more frequent than was formerly supposed. General practitioners who were not doing very much surgery, not seeing the actual conditions, were liable to have a very vague impression of what was going on within the abdomen. After gastro-intestinal ulcer was diagnosed, it should be dealt with surgically, as soon as possible.

Dr. R. C. Coffey of Portland, Oregon, pointed out that these ulcers were frequently the seat of cancer. We had learned that ulcer and cancer occurred in the same location. We had also learned by observation that this site was where the gastro-intestinal contents had become detained for some reason or other. Ochsner had been working on the duodenum, and thought that it was at least one among other locations for ulcer. Ulcer at that point was rarely seen until the cæcum was reached. A frequent seat of cancer was the cæcum. Fæcal matter was detained here for a while; then it passed over until it reached the sigmoid. Very rarely was cancer found at the splenic flexure, at the hepatic flexure, or in the transverse colon. The next frequent point for ulcer and cancer was the sigmoid, and next the rectum.

Dr. Niles, in closing, pointed out that the first and most important step in our progress in this line of work was to realize the frequency of ulcer and to diagnose the acute pathology. The means of treating it could be taken up later.

THE SURGICAL TREATMENT OF SPLANCHNOPTOSIS

Dr. Byron B. Davis of Omaha, Nebraska, presented a brief statement of the anatomical changes found, and described the various surgical procedures which have been proposed and carried out for the relief of this condition. He reported nine cases upon which he had operated. He considered the relative merits of the several operations that are done for the relief of this condition, and spoke of the value of surgery in extreme cases. Harris had shown that the kidney was forced out of its normal position because of narrowing of the lower thorax and upper abdomen. This was probably a causal factor in general visceral ptosis. The author was inclined to believe that in many of the cases the narrowing about the arch of the ribs was an effect and not a cause. When splanchnoptosis existed, the most of the abdominal viscera were below the umbilicus. The tendency to produce a vacuum in the upper abdomen caused sinking in of the epigastric region, and there was a gradual recession of the lower ribs. In most cases he believed the relaxation of muscles or ligaments was due to a general malnutrition, and it would be hard to determine which was the first to give way. Probably many times the stretching of muscles and ligaments was simultaneous, both due to the bodily tone being below par.

No treatment, medical, mechanical, or surgical, would be successful that did not recognize all the disturbing factors. He did not believe that any case of extreme splanchnoptosis was ever cured by medical or mechanical treatment. The mild cases did not cause much trouble if left to themselves; or if treated intelligently, with the idea of aiding digestion by suitable diet, relieving constipation, and strengthening the abdominal muscles by massage, the descensus might not increase. The severer cases might be sufficiently mitigated by the well-known methods to render life bearable. But when the liver dropped down three to six inches the stomach lay below the level of the umbilicus, the mesentery was elongated to double or triple its normal length, and the kidneys moved about at will. It made no difference what the treatment was, whether medical or mechanical, and no matter how persistently it was carried out, the viscera would remain outside their natural orbits, although sometimes the condition might be made less distressing. Nine years ago, when he read his first paper on this subject and reported two cases operated on, the criticism was so harsh that he made

up his mind to be extremely conservative in the future, and not to operate on any cases unless all possible effort had first been made by all the known medical and mechanical means to relieve the more serious symptoms, and even then not to operate on any one unless the condition was so severe that life had become practically no longer bearable. This resolution had been strictly adhered to, but he had the seven additional cases mentioned to report, not counting a large number of nephropexies which would not be considered now. He would only say that he had considered the kidney by itself. When a movable kidney unquestionably produced serious disturbances, whether or not associated with a general splanchnoptosis, it was anchored. He had been well satisfied with the method advocated by him in a paper read before the Association in Chicago in 1901.

Various operative procedures have been tried, and it was noteworthy that all the methods had given more or less relief of the more urgent symptoms. Two distinct classes of operations had their adherents. 1. The prolapsed viscera were in some way sutured or suspended in as nearly the normal position as possible. 2. The abdominal capacity was sought to be decreased by narrowing the abdominal wall by plastic methods.

In the correction of gastroptosis by the first or direct suspension, four different methods had been advocated. 1. Direct suture of the stomach-wall to the abdominal wall — gastropexy. 2. Suture of the gastrohepatic and gastrophrenic ligaments to the abdominal wall — gastrosuspension. 3. Shortening of the gastrohepatic and gastrophrenic ligaments. 4. Suspending the stomach in a hammock made by suturing the omentum to the abdominal wall.

Numerous variations of these procedures had been used, but all followed the principles of one of these four methods.

LATE PHLEBITIS FOLLOWING CLEAN ABDOMINAL OPERATIONS

Dr. W. W. Grant of Denver, Colorado, presented that form of phlebitis culminating in the veins of the legs, and which was known to occur most frequently about two weeks after simple aseptic abdominal operations, without being preceded by a faster pulse, elevation of temperature, pain, or any indication at present known of its advent. In the great majority of cases it culminated in the vessels of the left leg, no matter where the incision was made.

The author quoted at length from the literature, and showed that the ætiology of this condition was still very obscure. His belief was that the cause of phlebitis of the epigastric, iliac, femoral, saphenous, and tibial vessels, occurring late after a perfectly aseptic operation, and clean, prompt healing of the wound, was probably not septic, with our present knowledge of pathogenic bacteria and their actions. The specific cause or causes were unknown. The cases, of which a good illustration was reported, were very difficult of satisfactory explanation. In the absence of convincing or pathological evidence, and in the face of profound surgical skepticism, it was not rational, in the best and cleanest days known to surgery, to assume infection that was devoid of satisfactory evidence. The condition which caused thrombosis before the inflammation, or the phlebitis preceding a thrombus, was the vital question. It was exceedingly difficult — in fact, quite impossible — to reconcile the facts with the recumbent position, the simple ligature, or injury to small veins in a distant field on the opposite side of the body, although admitting that infection might not come from the site of operation. The author believed that there was a general condition affecting the composition of the blood that might be caused before operation, which was an essential factor in the cause of thrombophlebitis in these cases. A careful scrutiny of patients should be made before operation, and an examination of the blood made before and after operation. If the patient was chlorotic and anæmic, or the conditions not satisfactory, the health should be improved, if delay was permissible, by the administration of iron and acids, and metabolism improved by a suitable food-supply, while specific or constitutional affections should receive just consideration.

DISCUSSION

Dr. A. C. Stokes of Omaha, Nebraska, said there was referred to him an anæmic, pale woman, 56 years of age, in whom beginning carcinoma of the rectum was suspected. She was given an anæsthetic for the purpose of examination. A speculum was introduced well up into the rectum, without producing any great amount of traumatism to the mucous membrane. After this the patient was returned to bed and kept there on account of her anæmic condition. Four days later she developed phlebitis. He was unable to say whether the phlebitis was due to the traumatism of the rectum or to the anæsthetic. He thought it was the anæsthesia which produced a general toxæmia in some cases, and this might produce, in turn, a chemical change in the blood, which, at times, might produce, in connection with rest in bed, venous stasis, etc. He was inclined to believe that the great majority of cases of phlebitis were

septic, and whenever he saw a case of phlebitis he always searched for a focus of infection.

Dr. Harry M. Sherman of San Francisco cited a case of phlebitis of the left femoral vein in his own practice, and mentioned two others occurring in the practice of other surgeons, all three operations having been done by different men, and each operation for a different condition.

Dr. Leonard Freeman of Denver, Colorado, said that femoral phlebitis occurred in connection with appendicitis sometimes when even no operation was done. He had seen a double femoral phlebitis result in a case of appendicitis within a few days, with the patient not lying in bed. Phlebitis occurred in connection with other conditions where there was no question about septic infection. For instance, he had seen it in an ordinary case of Pott's fracture of the right leg, and in one case of simple fracture a left femoral phlebitis resulted in the course of a week of two. In still another case of fracture of the left patella, a right femoral phlebitis developed, followed by a left phlebitis. These cases could not be explained by infection.

Dr. E. S. Wright of Salt Lake City, Utah, recalled his first case of phlebitis which followed an operation for appendicitis. The appendix had ruptured and had filled the pelvis with pus. He drained through the cul-de-sac, and the vagina had become partially obliterated. Possibly the traumatism incident to the introduction of the speculum in this case contributed to the result. The patient recovered from the phlebitis without any particular treatment.

Dr. J. Clark Stewart of Minneapolis, Minnesota, said the general impression among pathologists was that thrombosis is, in many instances, of bacterial origin. The term "sepsis" is the *bête noir* of surgeons, and, naturally, surgeons refused to accept sepsis as a cause of anything in connection with what they were doing. If the term "bacteriæmia" were used, they would perhaps be more willing to accept it. It would seem that many cases of thrombosis were due to bacteriæmia. Pus bacteria entered the blood from unknown sources, and gave rise to such diseases as osteomyelitis. We knew nothing of the way the various bacteria got into the blood, but we knew in a great many cases there was a distinct bacteriæmia. There was only one thing to do, and that was to have blood cultures made of the cases that had femoral thrombosis, and to see whether or not they had bacteria in the blood. Bacteria in the blood did not necessarily mean sepsis, in a surgical sense, as a patient might have a certain number of bacteria circulating in the blood without clinical manifestations. It was only when some point of least resistance occurred that the lesions were localized.

Dr. Andrew C. Smith of Portland, Oregon, mentioned three cases of phlebitis in his own work from three different types of operations. None of them was immediately septic, but each of them remotely so. He attributed each case of phlebitis to the catgut, and thought the slight sepsis was due to late disintegration of the chromic catgut, and the absorption of toxins from that.

Dr. Union Worthington of Salt Lake City did not believe that trauma was the cause of phlebitis following operations. Whenever he had a case of phlebitis, it was his practice to look for infection, just as it had been his custom to look for a focus of pus when he saw a case of rheumatism. The fact that phlebitis more frequently occurred in the left than in the right leg had never been satisfactorily explained to him.

Dr. Grant, in closing the discussion, expressed the belief that blood examinations by bacteriologists and pathologists would settle the question. Pathologists had not been given a good chance thus far, because most of the patients recovered from their phlebitis. He did not think that the recumbent position was the cause, although it might be one of several causal factors. If recumbency was the cause, hardly a patient would go through a prolonged acute sickness without developing thrombosis or phlebitis. If it were due to that cause, a new definition of sepsis should be given. He was frank to say that recumbency did not explain the condition, for if it did, every patient with a fracture of the femur would have it. In all acute sicknesses, like typhoid fever, patients became debilitated and anæmic, had high temperature, and yet few of them had this condition.

THE PRINCIPLES AND MECHANICS OF ABDOMINAL DRAINAGE

Dr. R. C. Coffey of Portland, Oregon, read a paper on this subject, in which he referred to the work of Clark, Yates, and others. He presented the following deductions:

1. Fluids are rapidly absorbed by the peritoneal cavity; crude or granular matter only through lymph spaces at the diaphragm.

2. A drainage tract always contains micro-organisms.

3. Any form of drainage is isolated from the free peritoneal cavity in six hours.

4. A drain causes a flow of serum by irritation, which is profuse in proportion to the amount of drain within the peritoneal cavity.

5. This flow is delivered to the surface only in proportion to the amount of drainage passing out through the wound.

6. Serum and pus accumulate around drainage only when the drainage at the outlet is less than that contained inside, or is not sufficiently extensive to deliver the fluid before it is filled with *débris* and granulations.

7. Blood and pus are never found in the neighborhood of a properly applied drain after forty-eight hours.

8. The flow of serum dissolves blood-clots and thick pus, leaving the gauze clean and white by the time it ceases.

9. The flow of serum does not occur to any extent in formed abscess cavities; therefore, blood and pus are not well drained from them by capillary drainage.

10. A tube will drain a walled cavity and will drain the peritoneal cavity under the influence of gravity, but not otherwise.

11. A single tube is much more likely to be choked by intestines and omentum than two or more parallel tubes.

12. Gauze drains in proportion to the amount coming through the opening, and will only drain when it is in contact with dressings or clothing, or when its outside end is at a lower level than the cavity to be drained.

13. Small gauze drains are likely to be choked at the exit, unless covered by a tube or protective.

14. There are three cavities of the peritoneum to be drained, the right and left flanks separated from each other by the spinal column, and the pelvis separated from the flanks by the psoas muscles. Either flank holds more fluid, and is an inch deeper than the pelvis, and its bottom is more than four inches below the top of the divide made by the psoas muscle on which the appendix rests. The body must be elevated to an angle of fifty-one degrees to bring the bottom of the flank on a level with the divide, and sixty or seventy degrees to properly drain by the Fowler position. The entire cavity can be drained by gravity by a lateral position.

15. Drainage should always be in contact with the parietal peritoneum on one side. A line drawn in the center of the perineum to the tip of the shoulder passes through the pelvis and deepest part of the flank, and on the right side through the appendix. These diagonal lines we call the right and left drainage lines. Drainage should always be placed external to these lines, or just above the pubic bone.

16. If only one of the three cavities is infected, it alone should be drained.

Conclusions. Drainage must be extensive enough to do its work in less than six hours, and should reach the bottom of every infected cavity, either by gravity or drains. It should not be removed until it is loosened, which varies from six to fourteen days. Given the principles and mechanics of drainage, and a competent surgeon is able to fit his method to the case. Peritoneal drainage, intelligently used, is one of the most effective life-saving agents at our disposal.

DISCUSSION

DR. F. GREGORY CONNELL of Salida, Colorado, said the first point that interested him in the paper was with reference to the amount of gauze which came out of the abdominal wound; the surgeon might pack the peritoneal cavity with gauze, but he did not get drainage unless a large amount of the gauze came out of the abdominal wound. The lines of drainage pointed out by the essayist were appropriately named, and should be borne in mind. As to the removal of the drain in six hours, he did not quite understand the essayist in that respect. The essayist spoke of the drain being of no value after six hours, but in so doing did not specify as to whether it was a tubular or gauze drain. Furthermore, the essayist said that these drains should not be removed for six days.

DR. COFFEY said he was very sorry that he had been misunderstood. The fact was that drainage did no good after six hours; but one should not remove the drain, for fear that he would pull out the intestines and break down the protective wall which nature had made.

DR. CONNELL referred to lumbar drainage, saying that in some cases it might be advisable to make a lumbar puncture and drain the kidney-pouch, instead of putting the patient in the double exaggerated Fowler position.

DR. B. B. DAVIS of Omaha, Nebraska, said the conclusions of the essayist, in the main, were excellent, and should be taken as a standing guide. Personally, he drained for two distinct and different reasons. If there was a field of infection, he put in drainage, not to drain the abdominal cavity, but simply to sequestrate that part of the cavity from the part that was not infected, thus protecting the rest of the abdominal cavity. Another reason why he drained was where there was a general peritonitis and he wanted to drain the entire cavity. In the first case, when part of the cavity was sequestered there was a healthy peritoneal surface around there, and it was expected that this would be walled off in six hours, according to the experiments of Yates; but he did not believe he could accept Yates's experiments on the healthy

peritoneum of a dog. He did not believe the principle would apply to draining the abdomen of a human being infected with general peritonitis. Where there was a general peritonitis, he did not believe there would be a walling off in six hours.

Dr. H. G. Wetherill of Denver, Colorado, said the ideas of the profession with regard to drainage were crystallizing. Surgeons had learned that it was now not necessary to drain as frequently as was formerly done. Like the preceding speaker, he limited the indications for drainage. So far as his personal use of drainage is concerned, it is limited to the walling-off process which Dr. Davis spoke of; to the necessity for draining where the peritoneal coats of the intestine had been injured, and there was likelihood of a fistula; to the necessity for packing to arrest oozing, which could not be otherwise controlled, and to the necessity of leaving an opening for the walled-off cavity. Aside from those indications, he thought there was very little need for drainage in the peritoneal cavity. He felt surgeons had drained many times when it did no good, and when really it was instrumental in turning the scales against the patient.

Dr. H. D. Niles of Salt Lake City said the main conclusions of the essayist were based on sound logic. One of the conclusions was with reference to the propriety of establishing a rule of leaving a drain in six days because it could not be loosened without breaking the walls of the drain channel. His experience would lead him to believe that the drain could be removed sooner than that. There might be cases where it would require longer than twenty-four, forty-eight, or seventy-two hours, but there were very few cases, and personally he removed this drain in many cases in thirty-four or forty-eight hours.

Dr. Union Worthington of Salt Lake City called attention to the Miller tube, which is the more recent form of cigarette drain, in which a tube is put through a rubber tube to the bottom of the cavity; a plastic organization thrown around it forms a channel through which the pus reaches the surface after the drain has been removed.

Dr. E. F. Root of Salt Lake City said we needed a sinus in certain cases to drain an old cavity that was walled off. The drain, no matter what material you might use, would produce pressure necrosis that caused a sinus, and we were compelled to drain all of these walled-off cavities. On the other hand, if we had what was called general peritonitis or an acute infection that has only lasted a short while, where there was an inflamed peritoneum, or where there were pus-pockets in several places, drainage in such a condition was a physical impossibility.

Dr. Coffey, in closing the discussion, was very glad that Dr. Connell brought up the matter of draining the flank. The Fowler position was very hard to apply. If the patient was in an upright position, there would be drainage in most cases. It would always drain if the pus was not drawn back into the flanks. The flank was the place to drain the pus that was in the flank.

Dr. A. F. Jonas of Omaha, Nebraska, described and demonstrated an aid in intestinal suture.

COMPLICATIONS, ACCIDENTS, AND SEQUELÆ INCIDENT TO PROSTATECTOMY

Dr. J. N. Warren of Sioux City, Iowa, read a paper on this subject, in which he spoke of the condition of the gland influencing operation. He referred to the presence of active or chronic infection, and to the condition of the bladder as to contraction and dilatation as a complication; to the presence of vesical calculi, accidents, hemorrhage, puncture of the bladder, rectovesical fistula, rectal fistula, methods of management, sequelæ, incontinence or retention necessitating the retention of the catheter; to impotence, etc.

Dr. George Goodfellow of San Francisco said that up to the present time he had done 105 operations for the removal of the prostate, with two deaths. He gave a lengthy explanation of the cause of this low mortality.

Dr. W. W. Grant asked as to the proportion of cases suffering from incontinence.

Dr. Goodfellow replied that he had had no case of total incontinence. He had had, however, up to the present time four cases of partial incontinence. The cases of total incontinence usually never lasted over four months. In one case a fistula lasted eleven months.

Dr. Charles H. Mayo of Rochester, Minnesota, said that prostatectomy was not a minor operation. It had a fixed mortality that any type of serious operation would involve. He believed that the mortality from this operation was about six per cent. Dr. Goodfellow had a better mortality rate than most surgeons because he was an expert in this line of work.

MASSAGE OF THE HEART IN APPARENT DEATH FROM ANÆSTHETICS

Dr. D. S. Fairchild of Des Moines, Iowa, reported a case of massage of the heart in apparent death from anæsthesia, and reviewed the literature of twenty-four other cases. He spoke of the time after arrest of the heart when positive results might be expected. He discussed the best route for approaching the heart for the purpose of massage.

THE PERIPHERAL VERSUS INTRACRANIAL OPERATIONS FOR TIC-DOULOUREUX

Dr. Charles H. Mayo of Rochester, Minnesota, said that one of the most distressing diseases was facial neuralgia. More methods of internal, external, and surgical treatment had been advanced for its cure than for any other condition. In 1896 Dr. Abbe reported a case in which he interposed mechanical obstruction to the reunion of the nerve by placing rubber tissue over the foramina of exit of the nerves in the skull. For nine years Dr. Mayo had employed silver screws to obstruct the infraorbital foramen after torsion, removal of the nerve by the Thiersch method. For a less period the inferior dental canal had been obstructed with equal success. While not as effectual as the intracranial operation, because of the numerous branches, still the method controlled the two branches most commonly affected. It could be employed on many who would not submit to an intracranial operation, with its attendant mortality and occasional failures to cure.

ANEURYSMAL VARIX

Dr. J. Clark Stewart of Minneapolis read a paper on this subject, in which he reported an interesting case of large aneurysmal varix of the forearm, and exhibited photographs. He presented histories of such cases, and described the operative methods used. He likewise discussed the proper treatment of the lesions in the upper and lower extremities, and considered the radical difference in the conditions present.

SARCOMA OF THE MALE BREAST

Dr. F. Gregory Connell of Salida, Colorado, read a paper on this subject, which will appear in full in a later number of Surgery, Gynecology and Obstetrics.

MALIGNANT COMPLICATIONS AND DEGENERATIONS OF UTERINE FIBROMYOMATA

Dr. Charles W. Oviatt of Oshkosh, Wisconsin, in a paper on this subject, said the conclusions which were forced upon him by a study of reported cases were:

1. Women suffering from fibroid disease of the uterus incur a greater risk in allowing it to remain than in having it removed by a competent surgeon.

2. The fact that adenocarcinoma of the body of the uterus occurs much more frequently in cases of fibroid tumor than does cancer of the cervix leads him to believe that there must be a direct causative relation between fibroid tumors and cancer of the body of the uterus.

3. Every fibroid tumor removed should be subjected to careful laboratory study, no matter what its gross appearance.

DISCUSSION

Dr. Charles H. Mayo of Rochester, Minnesota, said that, for the good of the public, the quicker they learned that every tumor was a serious matter, the better it would be for them. There were some cases in which the constant irritation and pressure from a myoma produced a carcinoma of the opposite uterine wall. This possibility he explained to every woman who had a myoma, so as to give her a chance to decide in favor of or against operation.

Dr. Andrew C. Smith of Portland, Oregon, pointed out the necessity of operating before the transition of the tumor to the malignant stage took place. While it was wise to watch these cases so as to be sure that the transition to malignancy was not going on, as a matter of fact malignancy might suddenly supervene in spite of the frequent examinations of any one, and it was well advanced many times before one knew it. The surgeon, therefore, should not wait until hysterectomy was called for, but should do a myomectomy. A myomectomy, if done early, would prevent a large percentage of cases of invalidism, even where malignancy was not inherent in the growth, and as long as we could not tell what cases were malignant and what were not, he thought the edict should go forth nowadays, that when a simple myomectomy could be done with a mortality of less than two per cent, it should be performed without hysterectomy.

Dr. B. B. Davis of Omaha, Nebraska, said the malignant transformation of these tumors was more frequent than was supposed from the literature. He had had three cases of sarcoma of the uterus in which there was a previous history of myoma, where he felt confident that it was a transformation from a benign to a malignant condition, and not a sarcoma *de novo*. In each case a history of myoma extended far enough back so that it could be called distinctly a transformation, and he believed that this was one of the additional arguments always to be used with a patient in advising operation for myoma.

Dr. James B. Eagleson of Seattle, Washington, recalled the case of a woman who came to his office a few days before he left home. She had been suffering for ten years, her physician having told her that she had simply a small myoma of the uterus which would give her no trouble, and told her to let it alone. Now he feared that she had carcinoma of the uterus that was too far advanced to be operable. This case proved to him that these patients should be operated on as early as possible.

In confirmation of the statement made by Dr. Mayo, he reported one other case that occurred in the practice of a professional friend, where the irritation from a myoma caused cancer on the other side of the uterus. There was a myoma about the size of a hen's egg in the anterior wall, with a cancerous development on the opposite side, the size of a marble, which had developed from irritation on the other side.

Dr. Jabez N. Jackson of Kansas City, Missouri, described and demonstrated a point of technique in ligating the appendix in cases of appendectomy.

A CONSIDERATION OF THE TECHNIQUE OF LAMINECTOMY

Dr. Harry M. Sherman of San Francisco, California, read a paper with this title, in which he considered the relative merits of the simpler form of the operation as contrasted with the osteoplastic method, endeavoring to answer the question, Is the complex operation, with its sacrifice of motor nerves and its cutting of muscles for the sake of saving the laminæ, worth while? In general, this question was answered in the negative, but certain conditions were pointed out, as in a case of pressure paraplegia of vertebral tuberculosis, with a right-angled kyphos, in which the preservation of the laminæ, as a support for the longitudinal spinal muscles, might be essential for the complete and permanent relief of pressure on the cord, and in such cases the osteoplastic method might find a satisfactory use.

ABDOMINAL CONTUSIONS

Dr. William Jepson of Sioux City, Iowa, read a paper on this subject.

TREATMENT OF TUBERCULOSIS OF THE KIDNEY AND BLADDER BY NEPHRECTOMY

Dr. Leonard Freeman of Denver, Colorado, after reporting fourteen cases upon which he had operated for tuberculosis of the kidney and bladder, drew the following conclusions: 1. Tuberculosis of the urinary tract very often begins in the kidney, attacking the bladder secondarily. 2. Usually, it is at first unilateral. 3. Medical or climatic treatment is unsatisfactory in most cases. 4. The ideal treatment is early nephrectomy, providing there is one sound kidney. 5. Tuberculosis elsewhere, unless far advanced, is not a contraindication to operation. 6. Tuberculosis of the bladder derived from one kidney is positively benefited by nephrectomy, and can seldom be cured without it. 7. The demonstration of tubercle bacilli in the urine often fails. 8. The removal of the ureter is not ordinarily indicated. If sinuses result, they nearly always heal with time.

DISCUSSION

Dr. Charles H. Mayo of Rochester, Minnesota, agreed, in the main, with the conclusions of the essayist. With reference to tuberculosis of the bladder, he had found that there were two types, one resembling superficial lupus, and the other the deep exudative and excavated form, eating up everything as it advanced. And so in the bladder we got the erythematous type, in which red areas were outlined somewhat like superficial ringworm. This did not penetrate the mucous membrane; it would be on the side of the bladder that the diseased kidney was on. This type of bladder lupus got better after removal by nephrectomy of the diseased kidney. But real tuberculosis of the mucous membrane did not get well except by its destruction, and he had not seen a case of real tuberculosis of the bladder get well from anything. They might get better, but they did not get well.

With regard to tuberculosis of the ureter and tuberculosis of the vas deferens, he thought it must be an exceedingly rare condition to find that tuberculosis ever penetrated through the wall of either the ureter or the vas. He had never seen any one who could report such a case. One would find pockets, nodes, distended hard areas, caseation, but he would not find that the disease penetrated all coats of these two structures. In the operation for tubercular epididymitis, he thought it was better to take out all of the vas, or else leave it in. If left in, he injected the vas deferens with pure carbolic acid, 8 to 10 minims, and did not follow it with any alcohol to counteract the action of the carbolic acid, and ligated the vas in the upper part of the field after the removal of the epididymis.

Dr. Philo E. Jones of Salt Lake City referred to the successful work of Wright and Bullock of London on localized tubercular infections. He said a gentleman who had just returned from Europe stopped over a few weeks in London for the purpose of studying and observing the work of these gentlemen, and he had informed him that he saw a number of cases of tuberculosis of the genito-urinary tract that were discharged, not only relieved of all of their symptoms, but the urine, also, was entirely free from all microscopic evidences of disease. A number of cases of persistent lupus were also seen that had resisted the faithful and persistent application of both the Finsen light and X-ray for months, and they were discharged well.

Dr. D. S. Fairchild of Des Moines, Iowa, said that practitioners of internal medicine seemed to have different views from surgeons in regard to the

necessity of operative procedures in tuberculosis. He heard Dr. Norman Bridge say, not more than a year ago, that tubercular glands of the neck ought not to be operated on; that those cases in which the tubercular process broke down got well permanently, and with less liability of involvement of other tissues than those that were operated on.

About two years ago a patient was referred to him for nephrectomy on account of possible tuberculosis of the right kidney. The physician in charge of the case was an excellent diagnostician and had reported this condition from his examination. Patient was admited to the hospital and presented this history: Some six months before, patient had pneumonia, and from that time on health was impaired. A diagnosis of tuberculosis of the kidney was made by an expert from examinations of specimens of the urine, etc. The segregator showed that the right kidney was the better of the two; that both kidneys were furnishing tubercle bacilli, also the presence of the staphylococcus, and a considerable amount of pus in the urine from both kidneys. After having the patient under observation for ten days, the kidneys were exposed, on the theory that something might be done in accordance with the views presented by some surgeons in the matter of decapsulation, and the left kidney, which was shown to be the worse by the segregator, was split down freely, while the one which was referred to him as the one to be operated on was simply decapsulated. Within two weeks after this time the tubercle bacilli began to disappear from the urine, and in three months' time they disappeared entirely. To-day the patient was well. He was not sure that the operative procedure had anything to do with the result in this case; and yet the patient had been an invalid for nearly six months before anything of that kind was undertaken. As stated, within two weeks after operation the patient began to improve, and finally there was permanent recovery. Within a year from that time she reported to him, when no tubercle bacilli whatever could be found in the urine.

Dr. George Goodfellow said he was afraid he was going to incur the disesteem of the members of the Association in the opinion which he was about to express, and that was to deny the contagiousness and infectiousness of tuberculosis. In 1896 he published a thesis in which he said this: "General tuberculosis is not communicable from individual to individual, nor from man to animal, nor from animal to man." Holding that view, and with the experience which he had had, and with the studies which he had made of the operative work of others, in tuberculosis of the genito-urinary tract he could not think, nor did he believe, that statistics would sustain the reports of permanent cure by operation upon tuberculosis of any part of that tract. That a patient might be relieved of serious symptoms, he was perfectly willing to admit, either by the removal of a suppurating tuberculous testicle, or by the removal of a suppurating tuberculous kidney; but it was not the tuberculosis that was causing all the suffering: it was the subsequent or secondary development of perinephritic trouble, such as abscesses, etc.; so that if, in these cases, in his opinion, general treatment, such as was applied to pulmonary tuberculosis, was applied to these patients for a long time, a greater number of them would recover. In operating for malignant disease, there was in many cases a rapid dissemination or development of the tuberculous condition, so that his conclusion in regard to operation would be to let it alone.

Dr. William Jepson said that the diagnosis of tuberculosis of the kidney was very rarely made in the early period of its existence. Not only was this true of the kidney, but internists would no doubt bear him out in saying that it was true elsewhere in the early period. As a consequence, we could well adhere to the views expressed by the author of the paper, that excision of certain portions of the kidney in the hope of saving the rest would but rarely be possible, because the kidney had already become so far involved, and even disorganized, that this was impossible. To recognize these cases early, it often became necessary to utilize the positive evidence that the lower animal would afford in the way of furnishing evidence of tuberculosis after being inoculated.

Dr. J. N. Warren of Sioux City, Iowa, said that probably infection of the urinary tract followed primary infection in some other location. Frequent examinations of the urine might be made, in which no tubercle bacilli could be found. He spoke of the importance of making systematic blood examinations in these cases. In this way we could get, from a pathological standpoint, almost a certain indication as to whether the patient had a tubercular focus or foci somewhere in the economy.

Dr. J. W. Andrews of Mankato, Minnesota, said he wished he could place more confidence in examinations of the urine in cases of suspected tuberculosis of the kidney. He had frequently had the urine repeatedly examined by several microscopists, and the rule had been that he had not found present evidence of tuberculosis in the urine, where there were other clinical evidences of tuberculosis of the kidney. He recalled a case which he had recently. The patient, a woman,

30 years of age, was having almost constant hemorrhage in the urine, with some pus. The woman complained of this symptom constantly. Careful segregation by the Harris segregator gave evidence of absolute soundness of the left kidney. There was absolutely nothing wrong with this kidney, so far as could be determined, but the segregator gave evidence of disease existing in the right kidney. Three times the segregator was used, with the same result. He suspected tuberculosis of the kidney, and sent the patient to Dr. Charles H. Mayo for examination and consultation, and Dr. Mayo confirmed the diagnosis. Nephrectomy was successfully performed, after which the hemorrhage immediately ceased. Blood examination previous to operation showed a gradually coming on anæmic condition.

INJURIES OF THE URETER

Dr. A. H. Kerr of Salt Lake City read a paper on this subject, in which he reported a successful case of ureteral cystostomy or ureterovesical implantation.

OPERATIVE PROCEDURES FOR CHRONIC URETHRITIS

Dr. A. C. Stokes of Omaha, Nebraska, discussed the incurable gonorrhœas in the male. He gave the reasons why this disease is so often not cured. He spoke of the havoc of gonorrhœa in civilization. A minute anatomical and pathological diagnosis must be aimed at, and having once arrived at a definite diagnosis as to the position of the infection, we should resort to the methods that are most applicable to its treatment. He spoke of external urethrotomy in its relation to chronic gonorrhœa, and of operating on cases of vesiculitis, prostatitis, and old infections of the vas deferens. He reported four cases where chronic gleet was treated by external urethrotomy and cauterization of the prostatic follicles and urethra. He discussed vasectomy in the treatment of infections of the seminal vesicles and epididymis. He described the technique of the latter procedure, and reported five cases upon which he had operated.

Dr. Dudley Tait of San Francisco read a paper entitled The Control or Elimination of Pneumothorax during Operations on the Chest, with illustrated lantern slides.

OFFICERS

The following officers were elected for the ensuing year: *President*, Dr. Charles W. Oviatt, Oshkosh, Wisconsin; *First Vice-President*, Dr. S. C. Baldwin, Salt Lake City, Utah; *Second Vice-President*, Dr. Jabez N. Jackson, Kansas City, Missouri; *Secretary-Treasurer*, Dr. Arthur T. Mann, Minneapolis, Minnesota.

NEXT ANNUAL MEETING

St. Louis, Missouri, was selected as the place for holding the next annual meeting; time, latter part of December, 1907.

TRANSACTIONS OF THE CHICAGO GYNECOLOGICAL SOCIETY

RUDOLPH W. HOLMES, M. D., Editor of the Society

Stated meeting, May 25, 1906.

The President, Dr. Frank T. Andrews, in the chair.

CONSERVATIVE CÆSAREAN SECTION

Dr. Charles E. Paddock: The patient whom I show you to-night I saw for the first time in January, 1904. She was then in labor at term. As I intend to report the case more in detail at a subsequent meeting, I shall not take up much of your time now. She presents a congenital dislocation of the hip, with a certain amount of contraction of the pelvis. The intercristal diameter is 23 cm. and the interspinous 22 cm. There is a marked inclination of the pelvis, and a false promontory of the sacrum. As near as I can arrive at the measurement of the conjugata vera, that diameter is 8 to 8½ cm. The outlet seems to be roomy enough. There is a marked lordosis of the lumbar vertebra. I find, on looking over my records, that she gives a history of walking rather late in childhood, but upon questioning her now she does not remember having made such a statement; in fact, does not remember when she first walked.

In the first labor, attempts at delivery had been made, but with no result. Craniotomy was then performed.

In March, 1905, she came to me pregnant, near term. As I could not guarantee a living child by normal delivery, I elected to do a Cæsarean section, and accordingly a conservative Cæsarean operation was done. The woman made an uneventful re-

covery. The child, however, was found dead two days later at the breast; the cause of death had not been ascertained. Now she comes to me again pregnant, at the seventh month; is very anxious for a child, but desires that I bring on a premature labor. However, she will submit to any decision I may make in the matter. I will not enter into the merits of the procedure of premature labor, but will simply say that I have brought the case here for diagnosis and to get the opinion of other members of the society in regard to it. If it is possible to deliver this woman by natural passage and give to her a living child, of course I shall be heartily in favor of it; but my opinion is, that, from what I know of this case, I could not guarantee any such result.

The case is here for an examination, and I would suggest that the chair appoint a committee for that purpose. You will notice that the patient has the characteristic gait of a patient with a double dislocation of the hip-joint.

OVOIDAL TUMOR OF THE CERVIX

DR. JOSEPH B. DE LEE: I have here a fresh specimen delivered a few hours ago. This specimen was removed from a woman who is a primipara, and who was delivered by a midwife on the 1st of May. On the fourth day of the puerperium she had a slight hemorrhage, and on the tenth day another hemorrhage of greater extent, and on the twenty-fourth day she had a severe hemorrhage. A physician was called, who diagnosed inversion of the uterus, and sent the case to me. On examination I found that the uterus was not inverted, but that a pedunculated ovoidal tumor hung from the cervix, simulating closely an inverted uterus. The pedicle of the tumor could be traced to the anterior wall of the uterus, just above the cervix, perhaps at about the level of the eflection of the peritoneum over the bladder. It was possible to pinch the tumor off close to the base, and on inspection the tumor showed that necrosis had begun in the outer portions of it. I tried to clean out the base of the tumor, that is, the uterine base, and found it was so tough that I could not do so with gloved finger.

The tumor presents some interesting features, in that the possibility arises that it is a neoplasm. Most of the tumors of this kind are either placental polyps or fibromata; but in this case I think the microscope will show something else. It is too recent a specimen to have made slides, and I present the specimen for what it is worth.

DR. LESTER E. FRANKENTHAL reported the following cases:

1. EXTRAUTERINE PREGNANCY NEAR FULL TERM

Mrs. C. S., 24 years old. Menstruation began at 14, always lasting one week; never painful or excessive. She was married in April, 1902. Was amenorrhœic for one month, and was subsequently curretted by some physician. Last menstruation was June 26, 1905. Early in August she was seen by me, and on examination I found the uterus enlarged, justifying a probable diagnosis of an early pregnancy. In September she had a slight flow, lasting an hour. In October she menstruated one day, accompanied with severe pain. In November she felt life. In January, 1906, she did not feel life, and was seen by me. This particular time I could not hear heart sounds, nor feel fœtal motion, and, since I could not separate the uterus from an irregular mass, I requested the patient to remain quiet, keep close watch of all her symptoms, and send for me in the course of a week. This she failed to do until eighteen hours before her operation. Not hearing from the patient, I may state that I telephoned some time in February, asking her husband what had become of his wife's case. He informed me that they had sent for another doctor. Feeling somewhat uncomfortable for having called them up, I disconnected. In February she menstruated for one week, passed clots pronounced by her physician as flesh, and one week later flowed again for a few days. In March she had scanty menstruation, lasting one week, and flowed again during the same month. In April she menstruated normally. She was seen by me May 18th, for the first time since January. I then found the uterus plainly displaced to the right and backward from a mass situated in the left half of the false pelvis. The head I could easily make out behind the ramus of the left pube, especially on account of its parchment-like feeling. I could likewise plainly make out the spine. An X-ray picture taken before the operation greatly assisted me in verifying my diagnosis. The next morning I did a laparotomy, finding the fœtus just as described, imbedded principally in omental adhesions, which were particularly intimate about the legs, feet, arms, and hands; the intestines likewise were included in this mass of adhesions. After delivering the fœtus, having separated the adhesions, the placenta put in an appearance, being entirely contained within the tube, which was easily separated from its adhesions. I cannot now tell whether I tore the cord off the placenta or whether the fœtus lay loose in the abdomen. The cord was only one centimeter in length. It was an easy matter to ligate off the tube and thereby remove the placenta.

In looking backward I feel that the reason why

I did not detect the extrauterine pregnancy on her first visit was due to the fact that I had an enlarged uterus, the accompaniment of an extrauterine pregnancy, with a tubo-peritoneal pregancy, the extrauterine pregnancy being therefore distant from the uterus and the proximal part of the tube. The visit having been made early in her pregnancy will, I think, account for this.

Microscopical sections are being made of the placenta and tube, the latter showing no sign of rupture. The fœtus, of female sex, 27½ cm. in length, shows the characteristic clubbed deformities of hands and feet of an extrauterine monster, and was partially covered with a thin membrane, probably the amnion.

The patient has, thus far, — six days, — made an uneventful recovery.

2. FŒTAL MONSTROSITY

This specimen was obtained after the second delivery of a patient whom I had confined three years previously for the first time. After the birth of the first child, this oblong, fleshy mass presented at the os, and I first took it to be a prolapsed limb. Upon more careful examination I found it to be adherent by a pedicle to the membranes or the placenta. The placenta was born after the birth of the second child, and with it came this amorphous anideus, and maybe acardiac, monster belonging to the lowest form of omphalosites. This parasitic fœtus, a shapeless mass, upon X-ray, shows a nearly perfect skeleton; you can see a skull, spine, sacrum, the long bones, and, I think, some of the digits. The parasite had a common amnion with the first-born child. Both child and parasite have a velamental insertion of the cord. The cord of the parasite seems to have but two vessels. A branch of this cord anastomoses in the membranes with a branch of the other velamental cord, or, more accurately speaking, the parasite has no cord at all, the vessels merely running in the membranes. The parasite is attached to the membrane, and a branch from the artery of the parasite's pedicle anastomoses with an artery from the cord of the first twin. Each of the maternal great-grandparents on the father's side was one of twins. They had ten children. Six of these were twins. Nine of these ten children lived, and they had two or three twins. The grandparent married a twin.

3. HYDATID MOLE

Mrs. B. L., 48 years old. She is the mother of nine children, and has had one miscarriage. The last child was born twelve years ago. She entered hospital December 24, 1905. Her last menstruation was two months previous. At the median line, just above pubes, a tumor was to be felt, reaching to within a fingerbreadth of the umbilicus, and extending nearly from one anterior superior spine of the ilium to the other. Bimanually, this tumor was found to be the uterus. Fœtal parts, heart tones, or movements, absent. Probable diagnosis, hydatid mole, principally based upon the disproportion between the oblong and transverse diameters of uterus, relative to the time of pregnancy. We have called attention to this diagnostic sign as much as thirteen or fourteen years ago, and have spoken of it to Dr. Findley previous to the publication of his paper.

January 9, 1906, sixteen days after admission, the cervix was found to be dilating, and the dilatation was completed manually, and the uterine contents, which proved to be a hydatid mole, removed. After the cavity was thoroughly emptied, it was irrigated with an iodine solution. February 8th, the vagina had to be packed, on account of severe hemorrhage. February 9th, the uterine cavity was explored. A soft oblong elevated mass was found on the posterior wall of the uterus. This swelling was intimately connected with the uterine substance, and was not present when the uterus was emptied of the mole. Otherwise the uterine cavity was found to be empty. February 21st, vaginal hysterectomy, on account of repeated hemorrhages. Patient left the hospital apparently in good condition. The ovaries were not removed, so that the presence of lutein bodies could not be demonstrated.

DR. ANDERS FRICK and DR. RUDOLPH W. HOLMES reported a case of

ACUTE YELLOW ATROPHY IN THE PUERPERIUM

Mrs. B., aged 38. Swede. Well-nourished woman. Primipara. The woman had enjoyed good health previous to the present condition. Had married late in life. Was fairly well in pregnancy. During the four or five days previous to the actual labor she was troubled with occasional uterine contractions. On February 7, 1906, in the early morning, regular contractions began. By three in the afternoon the pains were severe; so a midwife was called at 3:30 P. M. At 11 P. M. Dr. Anders Frick was called, to whom I am indebted for the privilege of seeing the patient and of presenting this report. Dr. Frick found the fœtus in a left-occipito anterior position; the head movable; heart tones present in the midline. The os admitted two fingers. The pains were very severe, and almost without intermission. A quarter of a grain of morphia was given hypodermatically.

On February 8th, at 11 A. M., Dr. Frick found

that there was little or no progress in the course of the labor. The os was dilated as on the previous evening; the head was still movable; the morphia had given little or no relief. Chloroform was given with pains, on account of their rapid recurrence and great severity; chloroform was exhibited for about twenty minutes; then none was given for the same period of time. At no time was surgical anæsthesia employed. In this wise the woman was carried until 5 P. M., when the head was found fixed, and the os admitted three or four fingers. At 6 P. M. the membranes ruptured spontaneously. At 10 P. M. the cervix was effaced, and the os practically fully dilated. At this time, under full narcosis, the forceps were applied, the woman having been in labor thirty-one hours. The deep anæsthesia lasted about ten minutes. A few minutes after the extraction of the child the woman regained consciousness. In all, about eight ounces of chloroform were given in the eleven hours. On regaining consciousness, the woman felt well, did not vomit, and at midnight fell asleep.

On visiting the patient at 11 A. M. on the 9th, Dr. Frick found she had slept without interruption until 10 A. M. She then was feeling well; temperature was 98.6°; pulse, 90. Urine contained no albumin. At three or four o'clock, vomiting set in, emesis occurring after the ingestion of food; later, the vomitus contained mucus. Temperature and pulse were the same as in the morning; there was no abnormal abdominal tenderness. Bismuth given to allay vomiting.

February 10th, 8 A. M., after each dose of bismuth, vomiting ceased for about two hours, then recurred until the next powder was given. Temperature was still normal; pulse, 80–90. The conjunctivæ and skin were slightly icteric. By the afternoon the vomiting had entirely ceased; she was drowsy, and talked somewhat incoherently, but answered rationally when addressed. Temperature still afebrile; pulse strong; tongue clear; liver did not reach the costal arch; abdomen not tender; lochia of normal appearance and odor. The pupils were contracted to an extreme degree. The urine was still abundant, with no abnormal constituents.

February 11th, 10 A. M. The patient has been delirious during night; had repeatedly attempted to leave the bed; is semi-conscious, momentarily being aroused when addressed; has taken some nourishment. Temperature still normal, as is the heart action. The icterus is slightly more pronounced. No tenderness of abdomen. The urine is still normal in amount (1,100 c.c.), without albumin. By evening the mental turpitude is more pronounced.

February 12th. At this time Dr. Holmes was called in consultation. The temperature was normal; pulse slightly accelerated. Icterus still present. Low delirium. Liver is not palpable; hepatic area tender on pressure. On percussion, the liver area is materially reduced. Percussion showed that the liver dullness did not descend below tenth rib. Uterus was in normal involution. At this time the diagnosis laid between an acidosis due to chloroform or an acute yellow atrophy, the latter being held more probable.

The same morning the woman was admitted to the Augustana Hospital. On this day saline transfusion was practised twice. Calomel, $\frac{1}{10}$ grain, was given every four hours. She had several involuntary bowel movements. Highest temperature $99\frac{4}{10}°$; pulse, 112. The urine was still free in amount, specific gravity 1014; bile present as a trace; no albumin.

February 13th. The condition on this day is essentially the same as on the preceding. No abnormalities were found in the urine. The only new sign was persistent muscular twitching. The lochia was very profuse — bloody. The highest temperature and pulse were $101\frac{2}{10}°$ and 124, respectively.

February 14th. The pulse gradually became weakened, and increased to 160 per minute; the temperature rose to $103\frac{2}{10}°$. The urine showed no albumin or abnormal anatomic constituents; was a deep cherry-amber color; there was a faint trace of indican; leucin was absent, but tyrosin was demonstrated.

Between the 12th and the 14th the liver rapidly decreased in size, ultimately being only half the normal size. Dr. Favill examined the woman and corroborated the findings of Drs. Frick and Holmes. A full post-mortem examination was not allowed. A small incision, only, was allowed over the liver; a small section was removed. The cut surface was yellow in spots; the capsule was loose and wrinkled. The sections which are here presented were shown to Dr. Hektoen, who corroborated the diagnosis of acute yellow atrophy, from the microscopic findings.

Dr. Effa V. Davis: I should like to ask if there was any history of this trouble during pregnancy in this case.

Dr. Holmes: She was perfectly well, apparently, during pregnancy. I did not examine her locally. I do not know about the condition of the pelvis. There was, I believe, slight contraction.

Dr. Davis: From whom did you obtain the history?

Dr. Holmes: From Dr. Frick.

DR. FRANKENTHAL: What I am going to say has no particular bearing upon acute yellow atrophy of the liver; but it has a bearing on the toxæmia of pregnancy, and I suppose acute yellow atrophy of the liver comes under the same head, and that is this: In the last three or four years I have requested all of my primiparæ to take sweats; I sweat them once a week for the last six or eight weeks of their pregnancy. If many of us did so, say for a year, with patients we have control of during their entire pregnancy, we might be able to get some statistics which might help us in drawing deductions as to whether sweating is of any value or not in avoiding one or all of the many phases of the toxæmia of pregnancy. Of course, the other emunctories, such as the bowels and kidneys, are well taken care of, and likewise the skin in general, the dress, and diet. But what I wished to call attention to particularly was the fact that I give my primiparæ a good sweat once a week. If they wish to call in one of the day-nurses to assist them in the giving of the sweat, they can do so, as it does not cost very much, — a dollar or a dollar and a half, — and the whole procedure does not take more than an hour.

DR. EFFA V. DAVIS: It is a question whether much elimination of the elements of toxæmia is brought about by the activity of the skin. Some assistance, no doubt, can be obtained through this channel, but it is a question whether or not it would be of sufficient value to repay us for the trouble taken, as suggested by the weekly sweating process. I believe far more can be done through the bowels and kidneys, as the perspiration probably only concentrates the blood without relieving it of its waste material.

DR. FRANKENTHAL: I wish to say that if any of us had a case of uræmia, we would try to eliminate through the skin as well as through the bowels. If we had a case of eclampsia, we would sweat the patient. In general practice, in a case of uræmia we would sweat the patient, and it is on that account I suggested sweating. I think, too, we do accomplish elimination through the skin. I know, likewise, that is true bacteriologically, and therefore I see no reason for not doing so.

DR. HOLMES (closing the discussion): As regards the subject of sweating, which was brought up by Dr. Frankenthal, if there is any deficiency in elimination by the bowels and kidneys, I most certainly would consider sweating the woman. I cannot see the necessity of it, however, in a woman who is perfectly normal.

With reference to the remarks of Dr. Davis, there can be no question that sweating does benefit a woman who is uræmic or eclamptic. It is a common observation that when a woman who is uræmic is put in a hot pack and perspires profusely, her heart tension comes down, and the symptoms are ameliorated temporarily. Gradually, as the eclamptic poison accumulates, symptoms will be aggravated, only again to be minimized by the use of the hot pack. I have so often seen the hard, full tensioned pulse of an eclamptic become soft and compressible, and symptoms of the toxæmia improve, under the influence of a hot pack, that I feel this is one of the most indispensable adjuncts in eclampsia-therapy.

I remember distinctly that Dr. Frankenthal, in this society, once made the statement, that if patients followed his directions implicitly, they need have no fear of eclampsia. However, he reported a case of eclampsia, whose urine was normal in the morning, and by evening he delivered her in eclampsia. He had the courage of his convictions that society evening when he declared he would no longer be so positive in his statements to his patients, that by following directions they would not become eclamptic.

DR. FRANKENTHAL: I agree with what Dr. Holmes has said. Two or three of my private patients, whom I kept track of during pregnancy, did not eliminate properly, according to the test-tube. I examined the urine of one of them accidentally on a Friday afternoon, when it was found to be practically normal. She went into labor that night and became eclamptic the next morning (Saturday). I examined the urine of another patient on Saturday afternoon, and she was delivered the following Sunday afternoon, and on the following Monday afternoon she became eclamptic, and within an hour Dr. Cuthbertson was sent for. In her case, too, the urine was apparently normal. There was a slight trace of albumin, but no more than we frequently find in uncatheterized specimens. In considering that experience, I have decided to sweat those patients. If many of us did that, and compared results, then only could we say whether it is of any value or not. The observations of a single man would not count for much.

In quoting a statement made by myself at a previous meeting, several years ago, I wish to remind Dr. Holmes of Olshausen's statistics on eclampsia, of the fact that he mentions that at least five per cent never have any albumin in the urine until after the attack, so that any statement I make to patients was made mindful of this fact.

DR. RUDOLPH W. HOLMES: Undoubtedly, the frequency of eclampsia in private practice is not far from one or two to the thousand. A practitioner never knows when his patient is going to have convulsions until they occur; if he follows a specific

prophylactic treatment on all cases, he soon gets in the way of believing his method is a sure preventive measure. As he rarely gets a thousand cases in a lifetime, he is certain of his contention; if he has the misfortune to get his nine-hundred-and-ninety-ninth and thousandth cases who get eclampsia, he excuses himself with the plea that the disease occurred in spite of his treatment. As toxæmia of pregnancy occurs not infrequently, and eclampsia so rarely, and as we never can tell in which cases convulsions will occur until they are present, we always must be uncertain as to the real efficacy of such prophylactic treatment in pregnant women who are in perfect health.

DR. PADDOCK: In a case which I was attending a short time ago, immediately after the delivery there was evidence of an eclamptic attack. The blood-pressure was taken and found to be very high, standing at 230. The patient had intense headache, with dimness of vision, and, as I say, every evidence of eclampsia. The patient was immediately put into a sweat, the headache was relieved, and the nervous symptoms disappeared. The sphygmomanometer showed the blood-pressure had fallen nearly to normal. As soon as the woman was taken out of the sweat, however, the blood-pressure would immediately go up again, with the return of the headache and other signs of toxæmia. Because of the good effects of the sweating, this was continued for six or eight hours, without any other treatment, excepting elimination by the bowels. By this procedure we succeeded in combating the eclamptic attack; so it would seem that sweating does do good. The clinical evidence in this case was sufficient to satisfy me.

DR. EFFA V. DAVIS: It seems to me that too much importance is attached to the mere examination of the urine in pregnant cases. There are many varieties of toxæmia, and possibly they do not all come from the same source, which may account for our having surprises now and then. I believe the average physician has his mind centered too much upon the urinary test. As a matter of fact, there are many other signs of toxæmia, which should be looked for, and the patient treated before scanty or albuminous urine appears, as these signs often do not appear till the patient is in eclampsia.

If one centers the attention upon mild symptoms — is *on the lookout* for them during the last months of pregnancy, even though the patient may not voluntarily complain, it might save some surprises, although there are types that develop during long, tiresome labors, caused by unrelaxing cervical tissues that have not shown these toxic signs earlier. I think I have experienced two of this class in my practice, but in both instances the eclampsia was mild in character. No doubt, patients eliminate by the sweating process to a moderate degree, but I recently assisted in the care of an eclamptic where no attempt was made to produce sweating, but the skin was very active during and following delivery, which was preceded by five serious convulsions. The patient perspired freely for four days, and then had two more convulsions. This case also had a convulsion when the pulse was as low as sixty.

DISCUSSION ON DR. PADDOCK'S CASE

DR. GEORGE SCHMAUCH: We (Drs. De Lee, Schmauch, and Reed) have examined the patient, Mrs. J., 29 years old, and find that she has a longitudinal scar on the abdomen, from a previous Cæsarean section. In my opinion, it is a typical case of double luxation of the hips.

We took the measurements of the pelvis, and they are as follows: Distance spines, 25.5 cm.; crests, 25.5 cm.; diagonalis conjugata, 10.5–10.1 cm.

There is a double promontory, and in my opinion the whole pelvis is also contracted transversely. Dr. De Lee made a measurement of the ischii, which were 10½ cm. It is a very remarkably strongly inclined pelvis; consequently we probably must subtract more than 2 cm. of the diagonalis to get the vera, and I do not think the vera is more than 7¾ cm. There is little probability that a premature labor would yield much of a result in this case, and as her uterus is somewhat inferior through the previous Cæsarean section, I think that this time Cæsarean section is absolutely indicated in order to get a living child. The woman is now seven months pregnant; and she has a very pronounced pendulous abdomen. We cannot expect a normal engagement of the head of the child with the kind of pelvis that this woman has, and on account of that I would advise Cæsarean section.

DR. JOSEPH B. DE LEE: In all probability this woman's pelvis, in addition to being contracted in the anteroposterior diameter, is a pelvis obtecta. She has lordosis of the lumbar spine, which would, in my judgment, interfere with the engagement of the head, even if the pelvis were large enough to permit delivery.

I disagree a little with Dr. Schmauch, in that I think she has a chance for a living child by inducing labor at the thirty-fourth week. Therefore, in my opinion, the indication for Cæsarean section would be a relative one. I do not know whether Dr. Schmauch means an absolute indication for Cæsarean section or a strong indication. If Cæsarean section is to be performed, the indication is for the relative Cæsarean section. I feel that the child could be delivered at the thirty-second or thirty-

fifth week of pregnancy, but the mortality would be such that one would naturally select abdominal delivery.

DR. CHARLES B. REED: I have nothing to add, except to agree with Dr. De Lee that the indication in this case for Cæsarean section is a relative one. I am, however, convinced that the operation of Cæsarean section is the only one by which this woman can be delivered with a reasonable degree of certainty of a living child. The mortality following premature deliveries is so great, even with the most modern appliances, and the difficulties of delivery in premature cases being considerably greater than in Cæsarean section, I believe the chances of a living child by early induced labor are much diminished, and I agree with Dr. Schmauch that the indication for Cæsarean section in this case is practically a definite one.

DR. GEORGE SCHMAUCH: The indication for Cæsarean section is not absolute by the deformity of the pelvis in this case, but the previously performed section leaves no other choice for the delivery of a viable child.

DR. CHARLES E. PADDOCK: I wish to thank the members of the committee for their report. It coincides with my opinion. There is nothing else to do but perform Cæsarean section.

CARCINOMA DEVELOPING IN THE INGUINAL GLANDS NINE YEARS AFTER REMOVAL OF THE PRIMARY GROWTH

DR. EMIL RIES: I have a specimen here which may be of some interest to the members of the society, slides of which you will find under the microscope. This specimen was removed from a woman upon whom I performed the first radical operation for carcinoma of the uterus over nine years ago. At that time I operated after the procedure which I have previously described, removing the tubes, ovaries, and pelvic lymphatics with the uterus. In the glands there were found nests of carcinoma. Besides, there were ducts lined with columnar epithelium, which have since given rise to considerable discussion in gynecological literature. This is the first case in which these glandular ducts have been found. The woman continued in good health until November of last year, when she noticed a swelling of the left external inguinal glands; at the same time, there was some œdema of the left limb. When she came for operation, something like six weeks ago, I found the left inguinal glands considerably enlarged. The left limb at its upper portion was œdematous. The right inguinal glands were slightly enlarged. The vagina was free, and the pelvis was free from recurrence of the disease. There were no signs of recurrence in any internal organ. In operating on the woman, I broke into one of the glands, and this gland discharged cheesy matter. I therefore hoped that the glands would prove to be tubercular, as one of the glands which I removed from the iliac artery and vein at the time of the operation nine years ago contained a tubercle, but to which I paid no particular attention at the time, because it was an isolated section. We made an examination of these glands, and you will see a specimen which has been prepared. You can see well enough it is carcinoma.

The interesting point is, that, while this woman was well and healthy in every other respect for nine years, with no recurrence of the disease in the vagina or in the neighboring parts, there is now, nine years after the primary carcinoma has been removed, a continued growth in the external inguinal glands.

The importance of the removal of the lymphatic glands in carcinoma of the uterus has been judged in various ways. It has been considered a very inconvenient operation, and one that is difficult and dangerous. The general tendency among surgeons is to pooh-pooh it. This case of carcinoma developing in the inguinal glands at a considerable distance from the primary growth nine years after the operation may throw new light on the importance of the glandular structures in carcinoma of the uterus.

FISTULA THE RESULT OF A FOREIGN BODY IN THE ABDOMEN AFTER LAPAROTOMY

The next case I wish to report is that of a woman, 33 years of age, who was operated by surgeon No. 1 on the 20th of September, 1905. He performed a laparotomy for pus-tubes. There was considerable suppuration in the abdominal wound after the operation, and the wound healed ultimately with a fistula. This fistula continued to suppurate, and in October surgeon No. 2 operated on the patient and opened a pelvic abscess, that is, he drained through and through from the abdominal fistula into the vagina. Considerable pus was discharged, with no improvement in the condition of the woman. While she had weighed 145 pounds, she now weighed only 80 pounds. At the time I saw her, which was on the 1st of March, 1906, she presented a condition of extreme anæmia and emaciation, and showed on her abdomen a sinus surrounded by exuberant granulations, which was discharging a green, foul-smelling pus. At times, small amounts of fæcal matter and gas would escape, suggesting the presence of an intestinal fistula. It was possible to pass a probe through the abdominal opening through the pelvis out through the small opening in the vagina. I enlarged this

opening, and investigated the inside of the abscess cavity as thoroughly as possible, but nothing was found. The suspicion of a foreign body entered my mind, but on examination I did not find any. I used metallic instruments, introducing them in various directions, hoping to find something, but was unsuccessful. At last I changed the method of treatment, and instead of using metallic I employed soft rubber instruments. Lo and behold, when I put a soft rubber catheter in, I felt something that did not feel like bowel. I introduced forceps and began to pull, and out came a sponge, twelve inches long, folded three times. Here was an explanation of the fistula, and as soon as the sponge was removed the fistula began to heal. In washing out the fistula a few days afterwards, the patient told me it felt as though water were running into the bowel. I therefore inserted my finger into the rectum, and felt the end of the soft rubber catheter in the rectum, and felt an opening through which a finger could be passed through the rectum into the abscess cavity. These fistulæ usually heal spontaneously, and I did not undertake any operation to close it. This abdominal sinus is now closed completely. The rapidity with which the abdominal sinus closed and the granulations disappeared, as well as the discharge, was surprising. The woman has gained thirty pounds, so far, in weight; she looks very well and is healthy. Occasionally there is a little discharge of pus from the vagina, very rarely a little gas, but no fæcal matter at all.

CASES WHERE "REFLEX SYMPTOMS" WERE PROVEN NOT TO BE "REFLEX"

I have repeatedly had occasion to discuss the non-importance of the reflex theory of gynecological troubles causing stomach troubles, headaches, and whooping-cough. (Laughter.) There are two ways of disproving the old theory, which, fortunately, now is not so much emphasized as it used to be, although there still are a considerable number of men who operate for retroversion, and shell out particles from the ovary for sleeplessness and similar troubles. One way is to observe the cases after they have been operated on successfully. For instance, let us take a case of retroversion or flexion of the uterus that has been operated on, and where the operation has resulted in a cure of the retroversion, so far as the retroversion is concerned; yet the symptoms, headache, nervousness, etc., and whatever others there may be, do not disappear. Here we have an operative recovery and an operative failure. So far as the symptoms are concerned, while the patient has recovered from the operation, she is not cured. That is one way of disproving the theory. That kind of case has occurred a good many times. I have personal observations of cases of cystic ovaries, retroversions, lacerated cervix, etc., operated on by others, where the patients' symptoms were just as bad as or worse than before the operation. The other way to disprove the reflex theory is to show that the symptoms are due, not to any disease of the genitalia, but to something else. The troubles from which these patients have suffered have been, in reality, vastly different from the diagnoses which had been made. That is to say, the real source of the patient's symptoms has not been the retroversion or a lacerated cervix, but something entirely different. Gynecologists have been drumming the reflex theory into the minds of the general practitioners to such an extent that at present the practitioners have stronger opinions on this particular topic than the gynecologists themselves. You all know how often a general practitioner will bring a woman to you to be operated on for retroversion or some similar affair because the woman has headache or epilepsy. I wish to report here briefly four cases that were sent to me for gynecological operations under varying diagnoses, and where the operation proved the independence of the symptoms from gynecological diseases to which they had been ascribed.

The first case is that of a woman, 39 years of age, mother of three children. She had never had any puerperal infection. She had one abortion. Then she had hemorrhages which continued for a considerable time. She then had disturbances of the urinary tract, such as frequent urination. She had constipation and pain in the stomach. On examination it was easy to find that this woman had tumors originating in the pelvic organs. These tumors were so large that they could be felt from the outside, and therefore the physician made a diagnosis of stomach trouble from reflex causes, from ovarian and uterine tumors. The patient was brought for operation for ovarian and uterine tumors. She had fibroids, and they were of good size, and she had an ovarian cyst. In examining the patient very carefully, I found that, in addition to the gynecological symptoms, there were distinct symptoms of gall-stone trouble. On palpation, the region of the gall-bladder was found to be sensitive. The stomach was not enlarged. The gall-bladder could not be palpated. On careful examination of the history, it was found that the patient's stomach trouble was decidedly like what we usually find in descriptions of gall-stone attacks. As this woman had fibroids and an ovarian tumor, it was all right to operate on her for those conditions. I told her, however, that I did not believe that this would relieve the stomachs cramps; that I thought

she had gall-stones. She pooh-poohed the idea, and said she did not want two operations. She wanted to be rid of the tumors, and she would find out afterwards whether she had any more cramps. We operated, and removed the fibroids, also the ovarian tumor. I passed my hand towards the gall-bladder and found that she had a stone in the cystic duct. I left the stone alone, and was glad that she was willing to experiment on herself. The woman recovered from the operation, and a week after it had her first cramp again. She has had repeated cramps since, and she is now making up her mind to have the gall-stone removed.

The second case is that of a woman, 28 years of age, who was sent in to be operated on for lacerated perineum, lacerated cervix, and enlarged uterus, which caused stomach trouble, according to the idea of the family physician. Examination of the woman showed a lacerated perineum, a lacerated cervix, and a thick uterus. She weighed 225 pounds. She had borne three children, the last one seventeen months before I saw her. She had had no puerperal infections. Aside from the enlargement of the uterus, etc., there were no gynecological symptoms. Her stomach cramps, on careful investigation, proved to be gall-stone symptoms, and I proposed to remove the gall-stones and not to operate on the uterus. I show you some forty-odd gall-stones which I removed. The big one was in the cystic duct. She made a good recovery and has had no further cramps, although her perineum is still slightly lacerated, and her uterus is thick, as it was before.

The next case is one of double ovarian tumor, fibroids, and tuberculosis of the left tube. The tumors were so large that they could be felt easily through the abdomen. The woman had some hemorrhages; she had some discharge. She had some pain in the abdomen, which went up to her stomach. The family physician called these radiating pains, and wanted the tumors removed, as he believed they were the cause of her trouble. He did not diagnose anything else. On examination I found the gall-bladder palpable and sensitive to pressure. I therefore made a diagnosis of gall-stones in addition to the tumors. There was nothing reflex about it. I informed the woman that an operation for the removal of the tumor would not relieve her stomach pains, and that I thought it was necessary to operate on the gall-bladder at the same time. She submitted to operation, and I removed the tumors. I enucleated the fibroids without removing the uterus. I removed the left tubercular tube, removed bilateral ovarian cysts, and removed the gall-bladder, containing a large stone. This is a solitary stone, egg-shaped, with no facets. The woman has been doing well since. She has had no further trouble from the gall-bladder or her pelvic organs.

The next case is that of a woman, 49 years of age, who was sent to be operated on for a laceration of the cervix, laceration of the perineum, and a retroversion of the uterus which caused reflex pain in the stomach, and for which she was to have a perineorrhaphy, trachelorrhaphy, and retroversion operations. The woman weighed two hundred pounds. On examination I found a lacerated perineum, a lacerated cervix, and retroversion of the uterus, and on investigating her history carefully, found a very good history of gall-stones. There was nothing reflex about it. I operated on her and removed the gall-bladder, which contained sixteen gall-stones. I did not operate for the slight laceration of the perineum, which she had had for twenty years before the gall-stones developed, which had apparently existed for six years before she came for operation. She made a good recovery. She still has a slight laceration of the perineum and a slight laceration of the cervix. But her symptoms were undoubtedly caused by the gall-stones.

DISCUSSION ON DR. RIES'S CASES

DR. ALBERT GOLDSPOHN: What Dr. Ries has said is true, that general practitioners are inclined to ascribe stomach disorders and kidney disorders to very insignificant pelvic lesions. That has been so for some time. They do not need to be severely criticised for it, because if they had not seen these lesions the patients perhaps would not have come to operators. We can excuse them for their mistakes, but we should be careful not to make them ourselves. But when Dr. Ries says that there is no such thing as a reflex or referred symptom, he is going too far, because when you consider these four cases he cites, in which he found gall-stones, for every one of these, each of us who does any considerable amount of work will have ten cases to every one of those four, where the women come with marked stomach disorder and some pelvic lesion which is considerable and demands operation, and surgical treatment of the pelvic lesions alone is followed by spontaneous recovery from the gastric derangement. Indeed, in most cases of marked pelvic lesions (not neoplasms) there is also a variable degree of dyspepsia or epigastric discomfort or distress, that in the majority of such cases spontaneously disappears gradually, if not at once, after the pelvic disorder has been corrected. To say that disorders in the genital sphere never cause referred symptoms in other non-adjacent parts of the body savors strongly either

of no observation or of observation by a strongly biased individual. If there is a retroversion that requires operation, and marked epigastric symptoms also exist, in my opinion these shut out my ordinary way of operating, because I should like to explore the upper parts. That determines the choice of route in operating.

If there is no nervous connection between the uterus and the stomach, why are pregnant women disturbed about their stomachs, who have a physiological something going on, not a pathological process? and why are they disturbed in the stomach chiefly? There is the theory of decidua-cells floating in the blood in pregnant women and causing nausea; but why do these cells not disturb other parts of the body, as well as the stomach? Take the cases Dr. Ries reports here. I will offset them by two or three times that number of girls or very young women with congenital retroversion due to imperfect development of the uterus and its supports, who, as they grow to maturity, suffer more and more from this condition. They become dyspeptic, and the cases that I could cite, if I had kept track of them, would show extremely dyspeptic symptoms, as diagnosed by the best of good medical men, not surgeons, who could hardly check the progress of the condition in these cases. Neither could I check these cases in their obstinate dyspepsia and consequent anæmia by medical or any other means, until I examined such girls or young women by repeated bimanual palpation, recto-abdominally if necessary, and detect a retroverted uterus, with cystic ovaries, dysmenorrhœa and leucorrhœa, and pelvic pains galore. Some of these girls were so extremely reduced that an anæsthetic was too dangerous. Then I have been enabled to effect an entrance into the vagina of these girls and correct the displacement of the uterus under morphine, holding it with a pessary; and not until that had been done could I succeed in introducing food which would begin to count in improving their nourishment. Then I accomplished what I could not do before, and what other men, who are better physicians than I am, could not do. These girls would then become stronger, so that later I could anæsthetize and operate upon them, which I would not do in their previous deplorable, emaciated, anæmic condition. A year after operation these patients usually pick up greatly, and many of them gained at least half of their original weight. As I have said, every case Dr. Ries cites I can offset by several of that kind.

Dr. Emil Ries: Dr. Goldspohn offers to offset every one of the cases I have reported to-night with a certain number of those he has operated for gynecological troubles, curing them. He does not say "reflex," but "referred" symptoms. That is different. I wish to say that these four cases are what I have seen within the last six months, not what I have seen during my whole professional life; and because Dr. Goldspohn wants to offset my cases, I want to offset some of his statistics.

A case comes to me with retroversion of the uterus, with nervous symptoms. I examine the woman, and say, "Yes, you have a retroversion; I can cure that retroversion by operation, but I cannot promise you that your nervous symptoms will be relieved." That was not what the woman wanted to hear. She wanted to hear that she was to be cured absolutely, and she offered me a fee. There is a man not far from me who believes, and I think believes honestly, that he can cure these cases by gynecological operations. I told the woman so, and she went to him. He operated on her. The patient became infected somehow, and had a rather severe convalescence. But she recovered, all right, and was said to be cured. She was fine. All the symptoms had disappeared. The operation, she said, was difficult, and I had been too cowardly to undertake it, and she let me know it. The other gentleman who operated on her was her savior, and that condition kept up for several months. The result of the retroversion operation was fine. A year afterwards the patient was in a sanitarium taking the rest-cure, where she had gone with the same symptoms as before. While the retroversion was cured, she was just as miserable as ever, and the other gentleman was a thief and I was a gentleman, according to that woman's statement.

Dr. Albert Goldspohn: Inasmuch as what Dr. Ries has said is a direct reference to me, I am entitled to reply. I recall that case very well; and I will say this, that if any man, who deals with women considerably and successfully, had examined that woman, he would have found a pronouncedly enlarged adherent retroverted uterus, with a cystic ovary larger than a large hen's egg, completely covered with adhesions, a gross pathological condition that Dr. Ries could not deny if he had it in his hands here in our presence. I did not attempt to operate through the inguinal canals, because I thought there was pus infection which had not died out. I must say right here, in his presence, that he was very much mistaken as to the gravity of this pelvic lesion, or there is some motive in the thing which I could not and cannot comprehend, because the pathology in that case was abundantly sufficient to demand an operation, be she a neurasthenic or not. Her pelvis was at fault, so much so that the pathological con-

dition needed to be righted, and whether she would develop into a strong, perfectly healthy woman I could not know, nor would it matter. But that good resulted from rectifying the gross pathological state is a fact which Dr. Ries himself has admitted in part. I received a letter myself from this woman over a year after the operation, when she was lauding my praises in great shape. Those are the facts, gentlemen. However, it is possible for patients to become reinfected after operations. We have to bear in mind that patients, when they undergo the ordeal of operation, have an idea that it is a sort of life insurance from their ever becoming sick again. They need to be righted on that subject. What may have happened to cause this woman to be sick again, if so, I do not know; but the results were satisfactory to me and to her for at least a year. But many nerve traumata can have prevented recovery of healthy nerves. However, considering the grade of pathology that this woman had, I should be surprised that any one would pass it over. I would regard it as cruelty not to relieve a woman of such a condition. Hysterical stygmata in such a case are altogether too probably the result of surgery too long delayed, and they are never recovered from without it.

DR. RIES (closing the discussion): I wish to say that I confirmed the diagnosis of adherent retroversion in that case, and I refused to operate, because my diagnosis was not only adherent retroversion, but a condition of neurasthenia which I considered immensely more important than the adhesions in the pelvis, and which I suspected very strongly could not be cured by an operation on the pelvic organs of the woman, but might, on the contrary, be aggravated.

I also wish to say that I saw the woman about a year after the operation, when the retroversion was corrected. The reason why I quit the case was because I doubted whether, after the cure of the local condition, her general condition would be any better than it was when she had the retroversion. It has been demonstrated in this case, as well as in others, that neurasthenia or "reflex symptoms" are not cured by correcting insignificant pelvic lesions.

DR. C. C. GRULÉE, by invitation, reported a CASE OF CANCER OF THE RECTUM IN A GIRL OF SIXTEEN. (See paper in June number of SURGERY, GYNECOLOGY AND OBSTETRICS.

DR. E. N. REED of the Cook County Hospital, by invitation, reported a CASE OF ISCHURIA IN A PATIENT WITH RETROFLEXIO-VERSION OF THE GRAVID UTERUS. (See paper in the present issue SURGERY, GYNECOLOGY AND OBSTETRICS.)

DISCUSSION

DR. RUDOLPH W. HOLMES: This woman was fairly intelligent; she observed her signs fairly correctly. She insisted she had missed only three periods, yet we found a tumor mass which suggested that she was between the fifth and sixth month of pregnancy. Two months ago the abdomen began to enlarge; now the bladder feels thick, with contractions which strongly simulate uterine contractions. Another thing was, the uterus, as it was retroverted, was excessively lax — boggy.

DR. CHARLES B. REED: The subject of early retroversion of the pregnant uterus is very interesting, because we frequently meet with such cases at or about the third of fourth month. Most of the cases respond readily to treatment. The majority of them can be restored readily to the normal position, and if the uterus has not been bound down to a degree that prevents permanence there, the adjustment of some form of pessary will retain it usually until its normal position above the inlet is fixed. The bladder bears the brunt of the injury. The uterus does not suffer, but the bladder suffers seriously, and sometimes with results fatal to the patient. It is necessary in these cases, as the nurse probably will know next time, to use either a long metal catheter or a soft Nelaton catheter with a stylet, otherwise the catheter does not reach the retained urine.

There have been a great number of reasons enumerated to account for this condition. One of the most widely accepted theories is that the filling up of the bladder so drew on the urethra and prolonged it that it was necessarily narrowed in its caliber as a rubber tube would be narrowed in its caliber by being stretched. This, however, is not tenable. I believe, also, that in my paper on the ætiology of this form of ischuria, from which the essayist quoted, I have demonstrated that "compression of the urethra," as an explanation of this symptom, is *absurd*, and while I do not feel that I can now *demonstrate* that this symptom is the result of a *pressure paralysis* due to the interference with the nerve-supply by the dislocated uterus, yet I believe that this is the only explanation capable of ultimate demonstration. It is the only theory at the present time which is plausible in accounting for the very irregular occurrence and non-occurrence of this highly important and dangerous phenomenon.

Another interesting fact in connection with these cases is that the diagnosis is sometimes obscure. It is possible at this time, early in the pregnancy, to confound the diagnosis with hydatidiform mole and with hydramnion, both of which, in some degree, resemble the conditions which we find in

retroflexed pregnant uteri with ischuria; and these conditions should be borne in mind in making a differential diagnosis. In adopting the plan reported by the Doctor, there is no possibility that error could arise.

The result in Dr. Reed's case was a very happy one, inasmuch as the prolongation of the retention for a few days more would have resulted, undoubtedly, in sloughing of the bladder-wall, the loosening of the mucous membrane, and, as frequently happens in these cases, a discharge of the entire mucous membrane of the bladder through the urethral canal, with death of the patient.

Another happy feature of his case was the restoration of the uterus to its normal position after the emptying of the bladder. This is not always so happy. It usually occurs that reposition of the uterus has to be effected by manual means or by mechanical means, as the use of the colpeurynter or similar instruments, or finally, in an emergency, the restoration of the uterus by a laparotomy.

TUBO-OVARIAN ABSCESS

DR. HENRY F. LEWIS: I have here the tubes from a patient upon whom I operated twelve days ago. One tube is an ordinary pus-tube, a tubo-ovarian abscess having developed on the right side, while the other one is a pus-tube with an apparently tubal pregnancy.

The case is interesting on account of the diagnosis between tubal pregnancy and pyosalpinx. The patient, a woman of 40, admitted the possibility of pregnancy. Her youngest child is 20 years of age, and she has had no pregnancy since. She has had no disease of any kind; there was no irregularity in the menses for the last sixteen years. There has been no miscarriage. She menstruated regularly until two weeks before I saw her. This is nearly four weeks ago. Then, at the time of her regular menstruation, she menstruated rather profusely, and kept on so doing for about two weeks. I then saw her and examined her carefully. She had no temperature. There was some fever between the times when there was pus coming from the vagina. There was a little Bartholinian cyst on the left side, unopened and not discharging. A microscopical examination of the discharge was not made, nor a bacteriological examination. The woman was examined under an anæsthetic. The uterus felt slightly larger than normal, in a normal position, while behind it there was a soft mass as large as a fist, apparently a single mass, yet distinct from the uterus. The diagnosis lay between pus-tube and extrauterine pregnancy. Later on I operated on her, and found there were both. The right tube was an ordinary pus-tube, adherent to the pelvic organs and posterior wall of the uterus. In removing the tube, pus escaped into the pelvis. Both tubes were removed and drainage established through the vagina, with good result. There was no reaction following the operation. The patient is now in good condition, although she has a slight discharge from an opening in the vaginal vault.

The left tube shows an abscess in the lumen, and another cavity, resembling a gestation-sac, distinct from this. The microscope shows villi in the latter neighborhood.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

THE TREATMENT OF ACUTE INFECTIONS BY BIER'S HYPERÆMIA. Bonheim.

Bonheim, at the Hamburg Medical Congress, April, 1906, reported a total of three hundred cases treated by this method. He observed unusually good results in ten cases of breast abscess. In three or four weeks the small wound was undiscernible. Likewise in perirectal abscess, buboes, and cases of extensive cellulitis, the method seldom failed. In the treatment of furuncles and carbuncles it was found necessary to continue the suction hyperæmia for long periods of time and to make the negative pressure strong. Periosteal phlegmons of the finger, even when complicated, responded quickly to treatment. In purulent joint inflammations, the method failed in some cases. In three cases of gonorrhœal inflammation of the joints of the hand, it was useless, not even lessening pain. In the treatment of tendon-sheath inflammations the author also met with several failures, probably due to early necrosis of the tendon. In summing up briefly, he states that induced hyperæmia is a potent antiphlogistic; that it acts more rapidly than and has many advantages over other methods; that the bad results can be lessened by better technique.—*Abstract of a Paper Read at the Medical Congress in Hamburg*, April, 1906. *Reported in Münchener med. Wochenschrift*, 1906, Nr. 18, p. 894. GEORGE E. BEILBY.

THE TREATMENT OF ACUTE INFECTIONS BY PASSIVE HYPERÆMIA. By Professor August Bier. (From the Surgical Clinic of the University of Bonn.)

Bier, in this article, presented to the world his valuable experience of several years in the treatment of acute and chronic inflammations by induced hyperæmia. While the principle of this form of therapeutics may not be an entirely new one, to Bier belongs the credit of placing the hyperæmic treatment of infected and inflamed tissues upon a scientific and practical basis.

The author, at this time, placed on record 110 cases treated by this method, in which the ultimate results had been carefully noted. His technique impresses one as being simple. In treating lesions of the extremities, an elastic band was applied some distance proximal to the infected area, with sufficient tension to produce an intense redness of the skin and a moderate amount of subcutaneous œdema in the distal portion of the limb. With proper adjustment of the bandage and the correct amount of tension, no pain is produced; only a slight feeling of fullness in the part. Existing pain from the infectious process is, as a rule, speedily relieved. In cases of mild infection the treatment was continued about ten hours daily; in the more severe ones, from twenty to twenty-two hours a day. In the interval the limb is gently massaged, after which the band is reapplied, either in the same place or a little higher or lower. As the inflammation subsides, the periods of hyperæmia are shortened. Where there were already collections of pus, they were first evacuated through small incisions before the beginning of treatment. The author asserts, however, that very often commencing abscesses were arrested and resorption of the inflammatory products took place; that purulent secretions rapidly changed to serous, and discharging wounds soon healed. In acute purulent inflammation of joints, it was sometimes found necessary, as a preliminary to the hyperæmia treatment, to make a few small incisions into the joint cavity. No drainage material or tampons were, however, introduced. His results were excellent, for in the most severe lesions recovery was complete, with full function. In a similar manner the author treated osteomyelitis with large abscess formations, involvement of joints, and epiphyseal separation, with the result that in a few cases even the necrotic bone disappeared, wholly or in part. Incisions were made only large enough to allow the pus to be evacuated. In the case of tendon-sheath suppuration, similar methods were employed, though here sequelæ were more common.

In none of the 110 cases did Bier see any harm done. To secure good results, however, he is impressed with the necessity of giving careful at-

tention to the proper method of applying the treatment. The hyperæmia must be marked, without being burdensome to the patient; it must diminish pain, and not increase it. The question of the time and amount of operative interference, the author believes, still needs further elucidation. The underlying principle in this method of treatment is, that by increasing the acute inflammation the resistance of the tissues which have been injured by the bacteria and their poisons is thereby markedly heightened. — *Münchener med. Wochenschrift*, 1905, Nr. 5–7. *Review, Zentralblatt für Chirurgie*, 1905, Nr. 20, p. 551.

GEORGE E. BEILBY.

THE EXPERIENCE OF VON BRÜNS' CLINIC IN THE TREATMENT OF ACUTE INFECTIONS BY HYPERÆMIA. M. von Brüns.

In von Brüns' clinic there have been treated, up to the present time, sixty-five cases of acute inflammation with Bier's hyperæmia. He details, also, thirty-four cases of panaritium and phlegmons of the upper and lower extremities, five cases of purulent inflammation of large joints, four cases of osteomyelitis, ten cases of infected wounds, five cases of circumscribed abscess, and seven cases of mastitis. The most noteworthy results were seen in the early cases and in the severe phlegmons of the extremities. An erysipelas was a frequent occurrence in the area cut off by the band. This complication occurred not fewer than six times. In only one case was it thought that the treatment caused the erysipelas. As a rule, this complication followed fresh pressure or operative interference after the extremity had been long constricted. The erysipelas followed a typical course, with frequently high temperature, but passed away without danger to the patient. Four cases of mild mastitis with circumscribed abscess treated by cupping gave very good results; two, much more severe, were likewise greatly improved.

The last case of double-sided mastitis showed at first very decided improvement under the hyperæmic treatment, but, later, septic constitutional symptoms developed, and recovery took place only after amputation of the breasts.

The author thinks that the severe course of the case, as well as the frequent occurrence of erysipelas, is to be attributed to the fact that the lymph-vessels in the compressed region become inflamed, due to the constant absorption of toxins elaborated in the wound, which is very markedly increased in streptococcic infections. The exact cause, however, of this complication the author is unable to state. — *Beiträge zur klin. Chirurgie*, 1905, bd. xlvi, p. 845. *Review, Zentralb. f. Chirurgie*, 1905, Nr. 45, p. 1221.

GEORGE E. BEILBY.

CONCERNING THE TREATMENT OF ACUTE ABSCESSES BY HYPERÆMIA. E. Ranzi.

This contribution is from the clinic of von Eiselsberg in Vienna, and details the results of Bier's method in 110 cases, all of which were treated in the dispensary of the clinic. Ranzi boasts, above all things, of the excellent functional results obtained by this method, especially in severe cases of phlegmon with tendon-sheath inflammation. He is of the opinion that by the method formerly used of extensive incision and tamponade he would never have been able to prevent, in similar cases, tendon necrosis. This fact, and the pain-alleviating effect, seemed to him to be the chief features of the new method. He also observed that the time required for treatment was much less by the congestion than by the suction method. As a conclusion, he states that, in his experience, the treatment requires much time and attention on the part of the physician, and that ambulatory cases require very frequent observation. — *Wiener klin. Wochenschrift*, 1906, Nr. 4. *Review, Zentralblatt für Chirurgie*, 1906, Nr. 27, p. 759.

GEORGE E. BEILBY.

THE TREATMENT OF ACUTE INFECTIONS BY CONGESTIVE HYPERÆMIA. By Dr. Hans Rubritus. (From the Surgical Clinic of Professor Wölfler, Prague.)

This author is very enthusiastic in his support of Bier's method of treatment. He asserts that Bier has not only shattered in its fundamental points the use of antiphlogistic agents which contend against congestion as well as against every delay to the flow of the blood stream, but has also gone a step further; he notices in the inflammation an especially useful preventive of nature against every infection, and is therefore inclined not to weaken the inflammation but to strengthen it. The method has been successful not only in chronic but also in acute infectious processes. For the more minute details of the employment of this method of treatment the author refers to Bier's monograph, which has recently appeared in the second edition, *Hyperamie als Heilmittel* (Hyperæmia as a Curative Agent), and concerning which the author has this to say: "The valuable material collected by Bier in this work, the great exactness with which every peculiar case was treated, the fact that Bier stepped before the public with conclusive observations after he had collected an experience of ten years, and finally, but not least, the surprisingly favorable results, — all these facts must allow the thought to

arise in the mind of every reader of Bier's publications that we possess in the congestion hyperæmia a remedy which is in a position to afford actual results. It is therefore only a matter of course that Bier's method has surpassed all others."

The reports from the clinics of Tübingen, Breslau, Marburg, and Heidelberg all show uniformly favorable results in the employment of Bier's treatment. In the Prague clinic it has been used continuously in the treatment of acute infections since the appearance of Bier's article, and with exceptionally good results under proper application. The author finds that the technique of its use is in no way simple, and as yet not entirely perfected. He states that the method is not always harmless, as proven by several of his own cases. It was found necessary in every case of acute infection to determine first whether or not it was a suitable one for the employment of the method.

He reports over a hundred cases thus treated in Wölfler's Clinic. In regard to the technique, he uses the suction apparatus mentioned by Bier and Klapp, and in the upper and lower limbs the thin rubber band employed by Bier. The Esmarch bandage formerly used in this clinic has been discarded because of the danger of its too tight application. The thin rubber bands, he finds, cause no irritation, except, perhaps, in women and children with delicate skins, and the parts seldom require protection. It was often found necessary, in order to obtain the proper degree of congestion, to readjust the bands several times. When the proper constriction is obtained, there is produced a moderate œdema, but no pain — only a slight sensation of fullness and tension. The blood-pressure apparatus of von Henle, which is frequently used to produce the hyperæmia, while it has the advantage of allowing the correct pressure to be easily made, has been discarded by the author as being unreliable for prolonged use. For producing hyperæmia of the head and face, he has always employed a simple cotton rubber band about the neck, in the manner described by Keppler. In most cases, the correct degree of congestion, flushing, and moderate œdema of the face were thereby produced, without any pressure irritation. For the suction treatment he made use of the suction apparatus devised by Eschbaum in Bonn. He prefers those with a rubber bag, that may be removed and sterilized. In many cases the passive hyperæmic and suction treatment were combined. For such a combined treatment he found that whitlow accompanied by lymphangitis, and infected wounds of the head and face, were especially adapted.

The author then describes his cases, classified under the various heads in which the hyperæmia treatment was used. They were as follows:

1. Whitlow, twenty cases. In fourteen of the cases the "suction-glass" alone was used. From two to seven applications were made. The cases healed rapidly. In one case, with accompanying lymphangitis of the arm, passive congestion was induced in conjunction with the suction treatment.

2. Phlegmon, eighteen cases. Here the rubber band was employed, the application being continued from eighteen to twenty-two hours daily. In two cases the "hand-suction" apparatus was used to accelerate the discharge of pus. Some inflammations of this character the author found could be cured in four or five days. In one case, accompanied by severe pain, temperature 39°, small incisions were made, and after three days of treatment the wound had healed and the temperature had reached normal.

3. Infected wounds, five cases. In four of the cases, rapid improvement followed the treatment; in the fifth, a gunshot wound of the foot, recovery was delayed.

4. Compound fracture, three cases. Two healed promptly, without complications. The third, involving the leg, was unimproved by the hyperæmic treatment.

5. Lymphangitis and lymphadenitis, nine cases. All cured in from two to six days' continuous treatment with the rubber bands, and without abscess formation.

6. Infection and suppuration of large joints, three cases. The treatment was attended by complete success in only one case; operation intervention necessary in the other two.

7. Acute osteomyelitis, two cases; one of humerus, one of femur. In both, rapid and complete recovery.

8. Mastitis, eight cases. Favorable results in all.

9. Periostitis of maxilla, three cases. Cured in from five days to three weeks. Hyperæmia induced by band about neck.

10. Abscess and furuncle, one perirectal, two periurethral, and seven abscesses of prepatellar bursa. Carbuncle and furuncle, twenty-two cases. All very favorably influenced by the hyperæmia treatment; many cases recovering without incision.

To quote the concluding paragraph of Rubritus's article, he says: "I arrive likewise at the conclusion that the Bier congestive hyperæmia furnishes splendid service in the treatment of acute suppurative processes, but with existing general septic infection it should never be applied."—*Beiträge zur klinischen Chirurgie*, 1906, bd. xlviii, h. 2, p. 282.

GEORGE E. BEILBY.

HOUR-GLASS STOMACH. By B. G. A. Moynihan.

The study of cases and a careful review of the literature have convinced Moynihan that there is no evidence that the hour-glass stomach is congenital.

The causes of acquired hour-glass stomach are: (*a*) Perigastric adhesions; (*b*) Chronic ulcer; (*c*) Malignant growths.

Symptoms. The symptoms and characteristics of hour-glass stomach permit of a positive diagnosis in the majority of cases. In fourteen of his last sixteen cases, a correct diagnosis was made.

1. If the stomach-tube is introduced and the stomach washed out with a definite amount of fluid, the partial recovery of this fluid will be noted; for example, if 850 grams were used, only 720 grams would be recovered. Wölfler, who first noted this sign, says that a part of the fluid seems to disappear as if through a large hole, when in fact it has escaped from the cardiac into the pyloric portion. (Wölfler's first sign.)

2. If the stomach is washed until the fluid returns clear, there may occur later a sudden discharge of a foul-smelling fluid, or if the stomach-tube is withdrawn and then introduced some minutes later, a few ounces of this foul-smelling fluid may be withdrawn. This fluid is regurgitated through the communication between the cardiac and pyloric portions. (Wölfler's second sign.)

3. *Paradoxical Dilatation.* If a splashing sound can be elicited and the stomach then emptied by a stomach-tube, a distinct splashing sound can still be heard. The cardiac portion only has been emptied; the pyloric portion still contains fluid and gives the sound.

4. Von Eiselsberg observed, in one of his cases, that inflation of the stomach with CO_2 gave rise to a prominence in the left of the epigastrium. After some minutes this gradually subsided, and simultaneously a prominence could be noted on the right side of the epigastrium. (Von Eiselsberg's first sign.)

5. Von Eiselsberg also directed attention to the gurgling, hissing sound heard upon auscultation after inflation of the stomach with CO_2. If the normal or dilated stomach is inflated with CO_2, this sound is heard at the pylorus only. If the stenosis involves the body of the stomach, this loud rustling noise can be heard 5 to 8 cm. to the left of the median line.

6. Moynihan has employed for about five years a method which has proved valuable in making the diagnosis of hour-glass stomach. The two halves of a Seidlitz powder are given after the abdomen has been carefully examined and the outlines of the stomach determined. About twenty or thirty seconds later, a loud tympanitic note can be elicited over the upper part of the stomach, while the tone over the lower part remains unchanged. By watching the abdomen for some time, occasionally the pyloric part can be seen to fill and become prominent.

7. Schmid-Monard, and likewise Eichhorst, has seen a distinct furrow between the two parts of the stomach after inflation with CO_2.

8. Ewald directed attention to the fact that if the stomach is filled with water and gastrodiaphany employed, the cardiac portion is transparent, the pyloric portion dark.

9. Turck and Hemmeter's balloon is introduced and inflated. The prominence is limited to the cardiac portion of the stomach, which lies to the left of the median line.

1. Gastro-enterostomy alone can be employed only in the few cases in which the stenosis is not more than from 2.5 to 7.5 cm. from the pylorus, in which the pyloric portion is small and not dilated, and can really be neglected surgically. In these cases the cardiac portion may be regarded as representing the whole of the stomach. If both parts must be drained, a double gastro-enterostomy, according to Weir and Foote, may be performed.

2. Gastroplasty is an operation of limited application. It is useful only in those cases in which a stricture without induration, fresh ulceration, or external adhesions is present. The cases in which it has been employed are rare, and even in these a more successful operation could have been performed. The operation consists of a long, transverse, or slightly curved incision through the stricture. The incision should be at least four inches long, and each end should be carried into healthy tissue. The middle of the upper and lower edges of the wound is grasped with artery-forceps, and later sutured vertically, as in pyloroplasty. Dr. Kammerer employs the principle suggested by Finney in his pyloroplasty.

3. *Gastro-gastrostomy or Gastro-anastomosis.* This operation was first introduced by Wölfler in 1894. He made a vertical incision 7 cm. long in each segment, and then united them, making a free communication between the two.

4. Partial gastrectomy is used more frequently in malignant than in benign conditions.

5. Digital divulsion or dilatation.

Adhesions to the anterior abdominal wall, liver, and pancreas may be so firm that operative manipulations may be very difficult.—*Mitteil. a. d. Grenzgebiet. Med. u. Chir.*, 1906, xvi, 143–160.

DEAN D. LEWIS, M. D.

LATE DEATH BY CHLOROFORM. By Tuffier, Manté, and Auburtin.

Chloroform is able to produce death several days after its inhalation, by producing lesions in internal organs and impairing metabolism. The writers refer to two cases, one in which a double salpingectomy and another in which a total abdominal hysterectomy was performed. For thirty-six hours their condition was excellent, when they suddenly were seized with a complex of symptoms, which can be epitomized as follows: Prostration and delirium, pupillary dilatation, adynamia, rapid pulse, normal temperature, continuous vomiting, bilious at first, sanguinolent later, subicteric conjunctivæ, *chloroform breath*, absence of peritoneal and leucocytic reaction, sterile blood. After three days, the first patient recovered; the other died. Autopsy revealed marked changes in internal organs, but no evidence of septicæmia. The analogy of symptoms between their cases and those given by various other writers forced them to conclude that the cases were due to an acute intoxication by chloroform. They give a brief review of the history of death by chloroform, stating that Casper first called the attention to the condition in 1850.

The condition was not recognized in France, and altogether there are on record about fifty observations. The accidents are more frequent in children.

The liver, kidneys, and heart were carefully examined. The liver has either the aspect of big fatty liver (Stiles and MacDonald, Forster), or more often it is atrophic, presenting the microscopical picture found in grave icterus (Bandler, Marthen, and writers).

Microscopically, all writers agree that there are lesions of *steatosis*. Some writers (Bandler) found degenerative changes with necrosis of epithelium. Most observers found the lesions in the periphery of the lobule. Stiles and MacDonald, and especially Bastianelli, found them in the peri-suprahepatic region.

The authors found centro-lobular fatty degeneration with intracellular biliary pigments, diffuse fatty infiltration, mostly marked in the center of the lobule. Chloroform may also produce cirrhosis in animals.

Kidneys. The presence of albumin after chloroform narcosis has repeatedly been noticed. The histology of kidneys of individuals dead by chloroform shows fatty degeneration, less pronounced, however, than that of liver. All writers agree that the glomeruli are intact. In some cases there is a capillary dilatation of cortical substance (Bevan and Favill). Generally speaking, the kidney is less affected than the liver by chloroform.

Heart. The writers are divided concerning the fatty degeneration of the heart. It was observed by some and denied by others. The writers found: Disappearance of transverse striation (stripe); occasionally, of that of longitudinal fibrillation; rarely, that of nuceli.

Symptoms. In ordinary cases there is usually post-chloroform albuminuria, often associated with casts. Widal found an excess of nitrogen in urine, diminution of urea, and disappearence of hippuric acid. The chlorine increases (Zeller and Kast).

In cases of acute intoxication, there is, after twenty-four hours, delirium, with periods of mental lucidity, generalized tremor, arterial hypotonus, rapid pulse (120–160), irregular respiration, and before death, Cheyne-Stokes type, *chloroform breath*. Violent and repeated vomiting, coffee-ground in character in the latter part. Icterus in fifty per cent of cases. Temperature about normal.

Diagnosis. There are practically no pathognomic symptoms. The complex of symptoms enables one to make the diagnosis. Among the very suggestive symptoms are: Chloroform odor, absence of peritoneal reaction in abdominal operation, presence of chloroform in the blood.

Prognosis. Serious, but not necessarily fatal. Even in marked intoxication recovery is possible.

Pathogenesis. According to the writers, the cause of death is due to the direct fixation upon the tissues through which it passes during narcosis. The late death is due to a supra-acute hepatitis.

Why is there an interval period between the chloroform narcosis and the appearance of symptoms? After the cellular destruction, there is, in addition to the poisonous chloroform, the toxic influence of disintegrated cells and also of other toxins formed because of inefficient function of the liver. These, of course, require at least twenty-four hours.

Treatment. Purely symptomatic. As far as the preventive treatment is concerned, one can safely say that if intervals are longer between narcoses, the lesions have time to repair themselves, and there is no danger of death. Offergeld (*Arch. f. klin. Chirurgie*, 1905, p. 708) advises a mixture of chloroform and oxygen. — *La mort tardive par le chloroform. La Presse Médicale*, May 16, 1906.

VICTOR L. SCHRAGER.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M.D. — E. C. Dudley, M.D.
John C. Hollister, M.D. — F. W. Lynch, M.D.

The Use of Oxygen in Gynecology. By J. Thiriar, Brussels.

The author first speaks of his results in his general surgical cases from the use of oxygen in the treatment of infections, and refers to his former papers on the subject (1899). "Since the time I first employed this method, all the cases of septicémie gazeuse I have had a chance to treat have been cured." Its use in gynecology he has more recently studied. He quotes Herman-Jaris as proving that:

1. Pure oxygen does not possess actual bactericidal action upon aërobic bacteria, but its action attenuates, in a large proportion of cases, the virulence of those bacteria and destroys their toxins by oxidation.

2. Oxygen augments protoplasmic movements of the leucocytes and hastens diapedesis. It plays a positive chemotactic part.

3. Oxygen favors phagocytosis in stimulating the vitality of phagocytic cells, in increasing their microphatic properties, and in so acting upon bacteria as to enable them more easily to be taken up by the phagocyte. (The mode of action is not known.)

Liffen's findings are then given:

1. Oxygen has little manifest action on the development and destruction of aërobic organisms.

2. The more anaërobic the microbe, the more rapidly its virulence and vitality were diminished.

3. Oxygen influences their function in stimulating their chromatogenic properties.

4. It diminishes the facility of manufacturing and eliminating of poisons, thus annihilating the products of secretion of the microbes, and consequently impeding the intoxication of the organism.

He then speaks of the use of the oxygen method in gynecology — "not only of value in gynecological infections, but it prevents them, also; it hinders the septic complications still too often observed after gynecological interventions."

He takes up the subject under three headings:

A. As a preventive of septic complications in gynecology;

B. As a curative measure in these complications;

C. As a therapeutic means to oppose gynecological infections.

A. As a Preventive

1. *Disinfection of the Genital Organs.* External organs and vagina are first shaved, scrubbed, and cleaned by some aseptic liquid. Then an ordinary vaginal canula of glass or rubber connected by a rubber tube to an oxygen-tank, fixed by a T-bandage over an aseptic wadding. A current of oxygen is allowed to flow for several hours. After removal of canula, a new contamination is prevented by a new aseptic pad.

"The gas penetrates everywhere — in all the recesses, the folds of mucous membrane, bathes the cervix, and externally the skin, through the wadding tampon."

Because of the possibility of allowing the gas to act so long for disinfection, the author says: "Vaginal asepsis, pre-operative, is then easily and absolutely realized by the oxygen method."

2. *Post-operative Preventive of Gynecological Infections.* "The oxygen method not only advantageously combats peritoneal infection, but invariably prevents it. In every abdominal operation, if we have cause to suspect the possibility of a peritoneal infection, we establish a continuous current in the abdomen, and that often for three or four days." The technique is given as follows:

After careful toilet of the abdomen, two long perforated tubes are introduced, separated by a wick of iodoform-gauze. One tube is connected with an oxygen-tank; the other, forming a siphon, is plunged into a receptacle containing some antiseptic solution. The abdominal wall is closed as usual, with abundant dressings. Intensity of current is measured by the bubbles. Secretions produced are also taken up by the discharge-tube, and can be examined (bullion cultures, etc.).

"Since the employment of this preventive means, we have been able constantly to prevent all the peritoneal infections in operations performed for infectious processes, even if the peritoneum had been contaminated."

Descriptions of cases follow the above.

As to the objection raised that the gas cannot go to all parts of the abdomen as soon as the quickly forming adhesions occur about the tubes, he says: "Clinical experience does not absolutely confirm those assertions. The drains are not obliterated, for the oxygen current passes. The passage of gas is not prevented by adhesions. In fact, if, some time after the establishment of the current, the exit tube is closed, one sees the belly become distended, and the patient complains of pain, the distention following the collection of gas in the cavity. After forty-eight hours, if the adhesions do form, it is of no import, for the cavity has already been cleansed of the infection."

Then he makes the following statement, based upon results of especial investigations made by his assistant, Roussiel: "The gas hinders the formation of intestinal adhesions; no irritation of peritoneum and no fibrinous exudate is produced. The oxygen method produces, then, an efficacious and lasting drainage of the peritoneal cavity. It hinders — it prevents — post-operative gynecological infections."

B. As a Curative Agent for Post-operative Gynecological Infections

1. *Infection of the Operative Wound.* Suppurating sutures, purulent collections in line of union, etc., can be made to heal in two or three days by first cleaning out, by irrigation, thoroughly, and then passing a permanent current of oxygen in through a well-fitting bandage.

2. *Peritoneal Infections.* After referring to various experiments and saying that his results have proven the truth of his statements, he says: "We have, then, in oxygen a perfect agent for combating peritoneal infections. It acts upon the aërobic as well as on the anaërobic; it increases the resistance of the peritoneum; it has a manifest leucotaxic action; it increases in considerable proportions the number of phagocytic elements; it possesses, in a word, the properties of a good *défense péritonéale*, for its action is on the bacteria, on their toxins, on the means of defense of the organism."

The technique is here the same as when used as a preventive. "One can have several currents and several siphon drains, to be certain to bathe the serosa in an oxygen atmosphere."

Tubercular Peritonitis. Under this heading he says: "All the tubercular peritonitis cases treated for some years in my service have been benefited by the oxygen method. Liquid is evacuated by a small canula introduced below the navel, and then a 'strong insufflation' of oxygen is made for a dozen minutes. Opening is closed and healing follows in some days, 'with assurance and absolute security.'"

C. The Oxygen Method in Infectious Gynecological Infection

1. *External Organs and Vagina.* Application to wound infections, abscesses, phlegmons (Bartholinitis) is described, and then the use of the method in erysipelas. In cases of vaginitis he remarks upon the gonococcus as being one of the rare microbes which show a certain resistance to oxygen. Its use, though, cleanses the vagina from other bacteria, and then it becomes easy to attack the gonococci with iodine or the silver preparations.

2. *Internal Genital Organs.* (*a*) *Metritis.* "Oxygen is here of so great service that curettage has become a rare procedure in my service." He then refers to two other articles on this subject — one by himself and another by his assistant, Dufour.

The technique consists of a single, or, better, double, tube or hollow sound introduced into the uterine cavity. The strength of the current should be sufficient to produce a light bubbling as it passes out through water. It is well tolerated, giving little pain. Treatment lasts for two or three days.

The results in metritis caused by staphylococcus and streptococcus are excellent. "It produces very rapidly disinfection of the uterine cavity; it causes a retrocession of inflammatory lesions of the mucosa; it modifies favorably its circulation."

In gonorrhœal metritis, its use should be followed by the employment of 1-100 silver nitrate to the endometrium, or by iodine.

Its circulatory modifying action makes the oxygen method of special value in hemorrhagic metritis. In post-puerperal metritis the uterus is first emptied of *débris*, etc., and then the oxygen current used. Its use here is *not* dangerous if used with double sound.

After speaking of the large number of cases he has treated, he says: Simple catarrhal metritis — staphylococcic and sterptococcic — are constantly healed by oxygen alone.

Gonococcal metrites need some antigonococicidal substance also. Hemorrhagic metritis, at times, needs a previous curettage; post-abortive metritis, always.

(*b*) *In Displacements of the Uterus — Uterine Tumors, Adnexal Tumors.* The accompanying endometritis is greatly benefited by the use of oxygen.

(*c*) *Pelvic and Adnexal Suppurations.* When the suppuration of the adnexa is clearly limited,

circumscribed, and without adhesions, and if the peritoneum has not been contaminated, the abdomen is closed. If the suppuration is extended, and has produced adhesions so that it is not possible to make a total and aseptic removal of the pyosalpinx, the oxygen treatment is indicated.

(*d*) The use of oxygen in the cure of fistulæ following gynecological operations he illustrated by describing a case in detail. — *La Méthodes Oxygénée en Gynécologie.*

J. C. HOLLISTER, M. D.

CORPUS LUTEAN CYSTS OF THE OVARY. By W. Granzdew, Kasan.

The following paragraph begins the article:

"There is no longer doubt that the corpora lutea of the ovary play a very important part in gynecological pathology. Sänger, Orthmann, Menge, Rosthorn, Oliva, Falk, and others have proved that this structure frequently is a starting-point for ovarian abscesses. Schottlander, Frank, and Orthmann have shown that they can serve as centers for tuberculosis. Voight, Martin, Schaller and Pfarringer, Granzdew, Michalazzi, Santi, and other authors, have observed the development of malignant neoplasms from the corpora lutea. Most often have the gynecologists to do with cysts of the corpora, serous cysts (in the narrow sense of the word), as well as blood-cysts — hæmatoma." (Exact references are given to above authors.)

Rokitansky and Klob's and Lee and Ritchie's macroscopical descriptions of cases are referred to, and then Shawjanski's and Nagel's microscopical findings are quoted. Nagel was especially inclined to believe that the absence of epithelium was the pathognomonic evidence that a cyst is of the corpus luteum. Bulius disputed this by saying that the epithelium is also absent in follicular cysts, and Steffek said that the presence of epithelium in the cyst spoke *against* its origin from the corpus luteum.

E. Fraenkel's cases (6) are then referred to, and Orthmann and Martin's monograph. Their descriptions are given in detail. Then Pfannenstiel's monograph is quoted, and the findings in L. Fraenkel's six cases are given in full. The question of the causation of cystic degeneration by disease of the syncytium ("Blasenmole") and the views of various investigators are given. These references cover the literature.

The author then says: "If one examine closely the literature, he can easily conclude that the question of corpus luteum cysts, in spite of the seemingly large number of investigations, cannot by any means be considered completely fathomed. For example, it is not completely clear to what size the cysts can reach, and yet this question of size is one of great practical interest. These cysts belong to the benign growths, and the clinical course depends principally upon the size attained."

Three cases are then reported by the author, clinically, macroscopically, and microscopically, and the question of size — typical structure of the cyst-walls and contents, etc., with constant references to the opinions of other writers on each subject — is discussed. The literature on the subject of hæmatoma of the corpora lutea is well covered, and the question as to nature and genesis of the cells of the epithelial layers is discussed.

Then the following seven points of conclusion and summing up are drawn:

1. Cysts of the corpora lutea can unquestionably attain considerable dimensions, and thus have important practical significance.

2. These structures, when they have attained considerable size, show different structure from their original make-up, and have a similarity to follicular cysts; yet the most extensive structures of this sort retain distinct anatomical points of differences by which one can recognize their origin from the corpora lutea; such as the folding of the lutein layer, particularly the presence of corpora lutea contained in it.

3. An especial form of multiple cystic degeneration of the corpora lutea exhibits the multiple development of hæmatoma in them, whereby the walls of the hæmatoma present the structure peculiar to the cystic lutin layer.

4. Hæmatoma of the corpora lutea can attain such a size that the gynecologist "must earnestly consider it."

5. The contents of a hæmatoma of the corpora lutea can arise from hemorrhage from the capillaries of the lutein layer which open directly into the cavity of this structure.

6. In some cases the so-called "epithel" which covers the cystic lutein structure (hæmatoma and serous cyst) on the inside is nothing else than morphologically changed endothelium of the capillaries of the lutein layer.

7. The overproduction of lutein tissue in the ovary one cannot consider specific for "Blasenmole" and syncytium. — *Zur Frage der cysten der Corpora Lutea des Ovariums.*

J. C. HOLLISTER, M. D.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M.D. RUDOLPH W. HOLMES, M.D.
C. v. BACHELLÉ, M.D.

MENSTRUATION FEVER, MENSTRUAL SEPSIS, AND OTHER COMPLICATIONS OF AN INFECTIOUS OR TOXIC NATURE. By George Riebold.

This article is based on observations extending over a period of two years, the material for study consisting of two thousand cases. After giving in detail the various degrees of the so-called menstruation fever, its symptoms, and certain ætiologic factors, Riebold states the following theory: that the inner genitalia at the time of menstruation may furnish a source for intoxication, and, under certain conditions, even for actual infection. He claims, by way of explanation, that we must grant the possibility of certain toxic substances entering the blood stream during menstruation, when the uterine mucosa forms a large area capable of resorption. At the same time the menstrual flow offers a most favorable culture medium for all sorts of saphrophytes, which, by their power of decomposition, furnish, in turn, the chemical products of metabolism or toxines. Riebold argues that if this is true of a perfectly normal flow, the results of such resorption must be all the more marked in a profuse or scant menses, where the escape is imperfect, permitting coagulation. The resorption, also, of the "residual blood," the minute subepithelial hæmatomata of Veit, should account in part for the rise in temperature.

In the case of general pelvic infection the question becomes less simple. The abrasions of the mucosa are the same as before, or greater. In lesser degree the condition may be not unlike that following abortion or normal labor. The protective power of the normal secretion of cervix and vagina being so often lost in pathologic conditions, an invasion of the otherwise germ-free uterine cavity is, theoretically, and very often actually, possible. Autoinfection may also be an ætiologic factor here, though practically it is a rare one. On the other hand, where germs of infection are brought directly into the vagina either just before or during menstruation, the opportunity for their further growth is exactly similar to that following an abortion or normal parturition. That such general infection does not occur much more often than it does can be due only to the marked bactericidal power of the vaginal and cervical secretions, as well as to the fact that women instinctively protect the genital organs during menstruation, so that infection does not enter. The anatomy of the normal genital tract also aids in this protection.

Riebold also regards the leucocytosis which accompanies menstruation as the result of resorption of the toxic products before explained, and therefore as analogous to menstrual fever. Clinically, he has come to look for both, particularly where the menstrual flow is slow or where it is unusually severe and continued. He has observed that this rise in temperature and in the number of white-blood cells occurs in entirely healthy women and in those suffering from various diseases. The different forms of rheumatism, diphtheria, typhoid fever, neuralgia, cardiac affections, and various skin lesions are the most frequently recorded affections, and their influence upon menstruation is considered at length.

In conclusion, Riebold believes that his theory offers a new point of view for many cases of sepsis where the origin is not clear. Prophylaxis and treatment is along the lines of personal hygiene.—*Ueber Menstruationfieber, menstruelle Sepsis, und andere wahrend der Menstruation auftretende Krankheiten infektiöser resp. toxischer Natur. Deutsche med. Wochenschr.*, bd. xxxii, Nos. 28, 29, 1906.

CAREY CULBERTSON.

PUBIOTOMY. By P. Rissmann.

Rissmann has performed this operation three times during the past year. After his first two experiences, he came to the conclusion that in the technique it is best to introduce the index finger as deeply as possible between the os pubis and the bladder, in order to direct the blunt needle and the saw more exactly and to be more certain of protecting the bladder from injury, especially during the sawing of the bone. In addition to this, he recommends that the vesical space be drained by a stiff tube, in order to prevent the formation of hæmatomas or

occasionally of thrombi, and also to assist in producing a permanent enlargement of the pelvis. With these principles in mind, the third operation was carried out with most satisfactory results. The patient was 33 years old and had a flattened pelvis with a true conjugate of 7.5–8 cm.

The points upon which he lays especial emphasis are the making of the saggital incision, mesial to the tubercle of the os pubis, in order to avoid injuring the muscle; the protection of the bladder by the finger during the cutting of the bone; the tight bandage of the pelvis during the delivery operation; the drainage; the non-use of a tight pelvic bandage during the puerperium; and finally, early permission of movement and early rising from the bed, so that the patient gets up on the eighteenth day after the operation.

Skiagraphs showed that the patients have a space between the cut ends of the bone about equal in width to the symphysis itself. This he does not believe occurs in case the treatment is carried out by the other methods.—*Zur Pubiotomie. Zeitschrift für Geburtshülfe und Gynäkologie*, bd. lvii, h. 3. C. V. BACHELLÉ.

THE METREURYNTER IN OBSTETRICS. By Bürger.

Bürger states that the value of the metreurynter is in its manifold uses, for, in addition to its service in the induction of labor and for increasing the strength of the contractions, it is of value in preventing premature rupture of the membranes, or as an obturator if rupture has already occurred. Its use is of especial value of accouchement forcé for eclampsia and for the control of hemorrhage in placenta prævia. The simplicity of the technique of its use is a very important factor.

Bürger reports 147 cases from Schauta's clinic. In the first group of cases, 16 in number, there had been no uterine contractions, and the balloon was used to induce labor or abortion. In most of these cases, other methods had been used in vain. In the second group, cases in which uterine contractions had already begun, and in which strong indications for interference existed, eclampsia and placenta prævia were most frequent. His statistics comprise 45 cases of eclampsia, of which 35 were primiparæ and 10 multiparæ. Twenty-one of these occurred before the pains had produced perceptible dilatation, and of the rest, none had reached the end of pregnancy. Eight of the primiparæ were over thirty years of age. In twenty-three instances, constant manual pressure was exerted on the balloon. In four cases only was an incision into the cervix necessary to deliver. Four times it became necessary to incise the cervix to deliver an after-coming head, because of contraction. In a similar number of cases, the use of the metreurynter was without effect.

In reference to the question as to whether the introduction and use of the bag with traction does not increase the frequency of the convulsions, he says that in twenty-two cases the attacks occurred even after delivery, but that in only five cases were convulsions observed during the use of the metreurynter. Nine of the forty-five cases died. The others had no temperature during the puerperium.

The metreurynter was used in nineteen cases of placenta prævia. It should be reserved for the most severe cases, in which dilatation of the soft parts is so slight that version cannot be performed without danger of severe tears. In 240 cases of placenta prævia at Schauta's clinic, the mortality was 8 per cent; of these cases, 19 were treated by means of the balloon, with a mortality of a little over 15 per cent (3 cases). He does not believe, with Küstner and others, that the use of the metreurynter gives better results for the child. Its chief action in placenta prævia is that of controlling the hemorrhage at the beginning of the labor.

In conclusion, he reiterates his praise of the balloon as a method of dilatation, especially as it is contrasted with the metal dilators, and calls it valuable as an aid to the obstetrician in difficult situations.—*Die Bedeutung der Hystreuryse in der Geburtshülfe. Archiv für Gynäkologie*, bd. lxxvii, h. 3. C. V. BACHELLÉ.

CORRESPONDENCE

Unnecessary Operations on Women

In the last twenty-five years the treatment of disease has become, year by year, more surgical. As a medical student twenty-five years ago, I can remember the limited application of surgery as compared with its range to-day. In the college clinic we saw fractures and dislocations, stone in the bladder, osteomyelitis, operations for strangulated hernia and extravasated urine amputations, the removal of the breast, an occasional ovariotomy, and operations for malignant tumors. We saw practically nothing of the great mass of work which fills the modern surgical clinic to-day. No radical cures for hernia, no appendicitis operations, no stomach surgery, no kidney surgery, no gall-stone surgery, no hysterectomies, little of modern gynecology, no resections of the intestines for carcinoma, no thyroidectomies, no laryngectomies, no brain or spinal cord surgery. These fields of surgery have practically been created since 1880.

Every one who has lived through the period in question, and who is in a position to compare the work of to-day with the work of twenty-five years ago, knows that thousands of lives have been saved and thousands of people have been freed from suffering by modern surgery. The advances have been marvelous. Modern surgery has been a great boon to humanity. Modern surgery has been so successful, it has become so easy to secure aseptic results, that there has grown up with it a curse, i. e., the doing of operations which are unnecessary and unwarranted. No class of operators has been entirely free from this curse, but the specialists, with their narrower range of vision and limited work, have undoubtedly suffered more from it than the general surgeon, who, however, has been by no means free from its influence.

The principal sufferers have been women, and the principal offenders have been men who have limited their work to gynecology. Women are the easy victims of the surgeon who advises and performs unnecessary operations. Nine out of ten women who consult a physician because they do not feel well will believe, if they are told so, that their sexual organs are at fault, and will submit to an operation if it is suggested that it is necessary for a cure. The result has been that where the general practice of medicine shows a wider application of surgical therapeutics than formerly, the practice of gynecology has become wholly surgical. There are many gynecologists who do not think of taking charge of a woman except for an operation, and the percentage of women who apply to them for advice, and in whom they find no indication for an operation, is so small as hardly to form, as the chemist would say, a trace in the sum total. This situation is an interesting study, and I shall endeavor to give my impressions of it.

Are all these operations necessary?

In reply to this question, I shall say that my own impression of the surgical work done on women, especially that done by men who limit their work to gynecology, is that certainly thirty per cent of it is unnecessary and unwarranted. These unnecessary operations are made up largely of the following:

1. Curettings without pathological warrant.
2. Repair of the ordinary torn cervix.
3. Amputation of the cervix.
4. The repair of the relaxed outlet, without any visible impairment in function.
5. The many operations for retroposition of the movable uterus.
6. The operations for so-called cystic degeneration of the ovary; a condition which is found in almost all female cadavers, and which is physiological and not pathological.
7. The removal of the uterus for small innocuous fibroids.
8. The fixing of the palpable right kidney, which is so common in women, that, depending on the personal equation of the operator, it can be found in from ten per cent to thirty per cent of women.
9. Operations such as resection or removal of ovaries because they are believed to be the cause of reflex symptoms in stomach, back, etc.

If I am right in my statement that thirty per cent of these operations are unnecessary and unwarranted, what is the explanation?

Are these operators dishonest?

Are they ignorant?

Are they misguided surgical enthusiasts?

The answer is, that some of them are dishonest, some are ignorant, and some are misguided surgical enthusiasts.

Some are dishonest, and operate for the patient's fee.

Some are ignorant of broad pathological principles, and operate on these cases because they have

been taught by their professors and colleagues to do so.

Some are misguided enthusiasts, who are honest, who have good anatomical and pathological training, but who have so limited their vision to their specialty that they believe that it and they are the center of the pathological female human universe, about which all else revolves.

If I am right in my statements, what is the remedy for this condition, which so menaces modern medicine? I believe that it is publicity; frank, open discussion in just such journals as this, which is not limited to a single specialty, but is devoted to the broad field of obstetrics, gynecology, and surgery.

A discussion in our medical societies of the subject of unnecessary and unwarranted operations might accomplish much good. Medical students must not be trained by the men whose misguided enthusiasm is responsible for most of this work. Operators must be made to realize more fully the great responsibility which is assumed in undertaking any operation, and must be made to see the criminal side to the unnecessary operation. Operators must broaden their horizon to cover the entire human body. The successful surgeon of the future will be the skilled general diagnostician who can operate. The gynecologist of to-day is extending his field and is operating on the appendix or kidney, gall-bladder or stomach, in many cases which, ten years ago, he would have submitted unsuccessfully to operations on the uterus and ovaries. The wider the territory which he covers, the better gynecologist will he become, and the fewer unnecessary operations will he perform.

I have limited my remarks to unnecessary operations on women because these present such a glaring evil, and I have singled out the gynecologist because he is responsible for much of this work. The same criticisms are to be made of the general surgeon or the operator in any specialty, who for fee, or through ignorance or misguided enthusiasm, submits a human being to the risks and costs of an unnecessary and unwarranted operation. All praise to the splendid achievements of modern surgery, all honor to the modern surgeon who gives to his patients the benefit of operations which relieve suffering and prolong life; but what of him into whose hands a patient's life has been intrusted, and who for fee or fame, because of ignorance or enthusiasm, risks this life by an operation which is not necessary and is unwarranted?

We should recognize the existence of this evil and make every effort to do away with it.

ARTHUR DEAN BEVAN.

SHORTENING THE ROUND LIGAMENTS

I note in the July number of SURGERY, GYNECOLOGY AND OBSTETRICS a magnificently illustrated article by Dr. Peterson, descriptive of a method of shortening the round ligaments within the inguinal canal through a single suprapubic transverse incision, and I gladly add my testimony to its correctness. I do this the more willingly, since experience has taught me to modify the operation in the direction of simplicity. I read a presentation of the operation at the spring meeting of the South Kansas Medical Society in April last.

The technique I now employ differs from Dr. Peterson's in this, that the inguinal canal is not split open, but, instead, curved forceps are passed along the canal to the internal ring and the ligament there seized and dragged along the canal and out of the external ring, where it is fastened by passing sutures through one pillar, then through the ligament and then through the other pillar. I double the ligament upon itself and allow the redundant portion to remain. In addition to the transverse skin incision, I have used the cross-fascial incision as well. This is advisable where the amount of intrapelvic work to be done is simple, for it gives easier access to the internal ring from the abdominal side, and allows the parietal end of the ligament to be observed better.

The dragging of the ligament through the inguinal canal, instead of splitting it open, has the additional advantage that it is not necessary to retract the skin so far laterally, and hence a lessening of the trauma. This amounts, ordinarily, to an inch and a half on either side. In some instances, however, where the cord is thin, I have been obliged to split the canal, in order to secure a firmer hold on the ligament and in order to be able to make a more direct traction. I believe it is desirable, in all cases, to attempt the simpler procedure, for, if it fail, the canal can be split and the more direct hold secured. I have not found it necessary to split the peritoneum in order to get a new hold, but have in all instances been able to do the necessary manipulations subperitoneally.

In those cases, on account of extensive pelvic work, where it is necessary to incise the skin in a longitudinal direction, I believe it is better to shorten the ligaments by one of the direct methods. With the longitudinal incision the extensive dissection required to reach the inguinal canal exposes too large an area of fascia, which complicates the operation. This is particularly true where the pelvic lesion is of an inflammatory character, making an infection of the wound possible.

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